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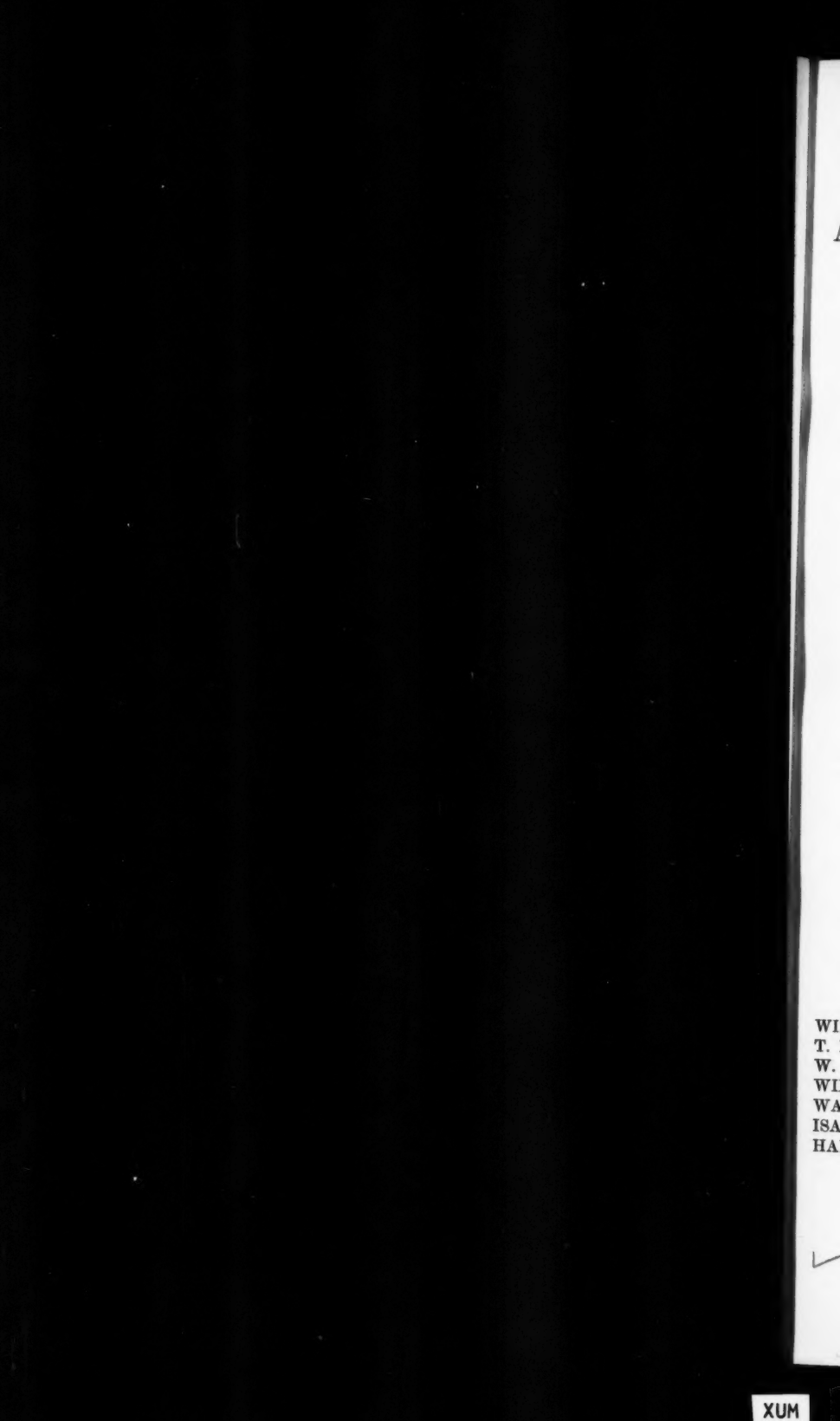

AMERICAN GEOGRAPHICAL SOCIETY.

OFFICERS AND COUNCILORS, 1880.

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CHARTER OF INCORPORATION.

GRANTED APRIL 13TH, 1854.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. George Bancroft, Henry Grinnell, Francis L. Hawks, John C. Zimmerman, Archibald Russell, Joshua Leavitt, William C. H. Waddell, Ridley Watts, S. De Witt Bloodgood, M. Dudley Bean, Hiram Barney, Alexander J. Cotheal, Luther B. Wyman, John Jay, J. Calvin Smith, Henry V. Poor, Cambridge Livingston, Edmund Blunt, Alexander W. Bradford, and their associates, who are now or may become hereafter associated for the purposes of this act, are hereby constituted a body corporate by the name of The American Geographical and Statistical Society, for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities, contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed; but the real and personal estate which the said Society shall be authorized to take, hold and convey, over and above its library, and maps, charts, instruments and collections, shall not at any time exceed an amount the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of said Society shall be a president, three vice-presidents, a corresponding secretary, a recording secretary, a librarian, and treasurer, and such other officers as may from time to time be provided for by the by-laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering

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the officers above named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of by-laws, not inconsistent with the laws of this State, or of the United States; which code, when formed and adopted at a regular meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers, and its members.

§ 5. The Legislature may, at any time, alter or repeal this act.

§ 6. This act to take effect immediately.

STATE OF NEW YORK, } ss.:
Secretary's Office, }

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this [L. S.] thirteenth day of April, one thousand eight hundred and fifty-four.

A. G. JOHNSON,
Deputy Secretary of State.

AMENDED CHARTER.

PASSED APRIL 8TH, 1871.

STATE OF NEW YORK, No. 237, IN SENATE, *March* 7, 1871.—Introduced with unanimous consent, by Mr. Bradley; read twice, and referred to the Committee on Literature; reported favorably from said committee, and committed to the Committee of the Whole.

CHAP. 373.

AN ACT in relation to The American Geographical and Statistical Society.

PASSED April 8th, 1871.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The name or corporate title of the said Society shall hereafter be The American Geographical Society of New York.

§ 2. The object of the said Society shall be the advancement of geographical science; the collection, classification, and scientific arrangement of statistics, and their results; the encouragement of explorations for the more thorough knowledge of all parts of the North American continent, and of other parts of the world which may be imperfectly known; the collection and diffusion of geographical, statistical and scientific knowledge, by lectures, printed publications, or other means; the keeping up of a correspondence with scientific and learned societies in every part of the world, for the collection and diffusion of information, and the interchange of books, charts, maps, public reports, documents and valuable publications; the permanent establishment in the city of New York of an institution in which shall be collected, classified and arranged, geographical and scientific works, voyages and travels, maps, charts,

globes, instruments, documents, manuscripts, prints, engravings, or whatever else may be useful or necessary for supplying full, accurate and reliable information in respect to every part of the globe, or explanatory of its geography, physical and descriptive; and its geological history, giving its climatology, its productions, animal, vegetable and mineral; its exploration, navigation and commerce; having especial reference to that kind of information which should be collected, preserved, and be at all times accessible for public uses in a great maritime and commercial city.

§ 3. The power given by the act hereby accorded to the said Society, to take, hold, convey, manage and make use of its real and personal estate, shall be understood as authorizing said Society to take and hold by gift, grant, bequest, devise, subject to all provisions of law relative to devises and bequests by last will and testament, or purchase real estate to the value of three hundred thousand dollars, and to invest its income, or its personal estate generally, so as to produce a regular annual income sufficient for the accomplishment of the purposes set forth in the first section of this act; but said annual income shall not exceed twenty-five thousand dollars annually.

§ 4. The said Society shall make an annual report of its proceedings to the Legislature.

STATE OF NEW YORK, *Office of Secretary of State,* } *ss.:*

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the City of Albany, this twenty-second day of May, in the year one thousand eight hundred and seventy-one.

[L. S.]

DIEDRICH WILLERS, JR.,
Deputy Secretary of State.

BY-LAWS.

CHAPTER I.

TITLE.

The title of the Society is, "The American Geographical Society."

CHAPTER II.

OBJECTS.

The objects of the Society are, "The collecting and diffusing of geographical and statistical information."

CHAPTER III.

MEMBERS.

1. The Society shall consist of fellows, honorary, corresponding and *ex-officio* members.

2. Honorary members shall be chosen on account of their distinction in the science of geography or statistics, and not more than twelve of them shall hereafter be elected in any one year.

3. Corresponding members shall be chosen from those who have aided the advancement of geography or statistics.

4. *Ex-officio* members shall be foreign diplomatic representatives and consuls resident in the United States; and United States diplomatic representatives and consuls in foreign countries.

5. Fellows and corresponding and honorary members shall be elected as follows: All nominations of candidates shall be openly made in writing at a meeting of the Society, or the Council, by a member thereof, and, together with the name of the member making them, entered on the minutes. The persons thus nominated, when approved by the Council and elected by the Society, shall, on payment of the initiation fee, if nominated as fellows, and without such payment if nominated as corresponding or honorary members, become members of the Society accordingly.

6. Persons entitled to become *ex-officio* members of the Society shall, on the recommendation of the Council, be by the Society constituted and declared to be such members.

7. The name of any member of the Society may, on the recommendation of the Council, and by a vote of two-thirds of the members present at a stated meeting of the Society, be dropped from the roll of its members.

CHAPTER IV.

INITIATION FEE AND ANNUAL DUES.

1. The initiation fee, including the dues for the current year, shall be, for a Fellow, ten dollars, to be paid immediately on election.

2. The annual dues thereafter shall be, for a Fellow, ten dollars, to be paid in advance.

3. Any Fellow of the Society, not in arrears, may commute for life all dues for fellowship by the payment at one time, if a Fellow, of one hundred dollars.

4. The name of any Fellow of the Society neglecting for two successive years to pay his annual dues, or at any time wholly refusing to pay them, may by the Council be erased from the list of Fellows of the Society.

5. The fiscal year of the Society shall, for all purposes, be the calendar year; that is, commence on the first day of January, and end with the 31st day of December in each year.

CHAPTER V.

OFFICERS.

1. The officers of the Society shall be a president, three vice-presidents, a foreign corresponding secretary, a domestic corresponding secretary, a recording secretary, a treasurer, and fifteen councilors; and these, together, shall form the Council of the Society.

2. The officers and members of Council elected at the next annual election (except the president and treasurer) shall, at their first meeting, divide themselves into three classes, each to embrace

one vice-president, one secretary, and five members of the Council; one of which classes shall hold office one year, one for two years, and another for three years, to be determined at said meeting by lot or otherwise. The president and treasurer shall always be elected annually; and at each annual election thereafter there shall be elected a vice-president, secretary and five members of Council, each for the term of three years.

3. All officers of the Society to be chosen at any election may be voted for on one ballot.

CHAPTER VI.

ANNUAL MEETING.

1. The annual meeting of the Society shall be held on the second Tuesday after the first day of January in each and every year hereafter, when the annual election of the officers of the Society shall take place; and if, from any cause, there shall be a failure of the annual election at the time above designated for that purpose, the same may be held on the Tuesday next following—that is, on the third Tuesday after the first day of January in each year—and of which due notice shall be given.

2. Every member of the Society, who has been such for twenty days or more, and who is not in arrears for his dues for the past year, shall be entitled to vote at the said election.

3. At the annual meeting of the Society the Council shall present a general report of its proceedings and of those of the Society during the past year, and the secretaries and treasurer shall also present their annual reports.

CHAPTER VII.

MONTHLY AND SPECIAL MEETINGS.

1. The Society, unless otherwise specially ordered by the Society or the Council, shall hold its stated meetings for the transaction of business on the second Tuesday of each month of the year, except July, August and September.

2. The president, or, in his absence, one of the vice-presidents, may, and upon the written request of five members shall, call a

special meeting of the Society by giving three days' notice thereof in two daily newspapers published in the City of New York.

CHAPTER VIII.

ORDER OF BUSINESS.

1. At all stated meetings of the Society for the transaction of ordinary business the order of proceedings shall be as follows:

1. Reading of the Minutes.
2. Reports and Communications from officers of the Society.
3. Reports from the Council.
4. Reports from Committees.
5. Nominations of Members.
6. Special Orders.
7. Unfinished Business.
8. Miscellaneous Business.
9. Papers read and Addresses delivered before the Society.

2. All propositions presented for the action of the Society at any of its meetings shall be in writing, when requested by the presiding officer or any member. A proposition thus presented, when seconded and the question thereon stated from the chair, shall be deemed to be in the possession of the Society and open for discussion, but may be withdrawn by the mover at any time before amendment or decision.

3. No member shall speak more than once upon the same question until all the other members present desiring to speak shall have spoken, nor more than twice on any question without leave of the Society.

CHAPTER IX.

QUORUM.

At all meetings of the Society nine members present shall constitute a quorum for the transaction of business.

CHAPTER X.

COMMITTEES.

All committees authorized by the Society shall, unless otherwise specially ordered, consist of three members each, and be appointed by the presiding officer.

CHAPTER XI.

PRESIDING OFFICER.

At all meetings of the Society, on the arrival of the appointed hour and the presence of a quorum, the president, or in his absence one of the vice-presidents, or in the absence of both a chairman *pro tem.*, shall immediately take the chair, call the meeting to order and preside. He shall have only a casting vote. He shall preserve order and decide all questions of order, subject to an appeal to the Society. He shall also, unless otherwise specially ordered, appoint all committees authorized by the Society; and at every annual election, before the opening of the polls, he shall appoint two tellers of the election.

CHAPTER XII.

SECRETARIES.

1. Foreign Corresponding Secretary.—It shall be the duty of the foreign corresponding secretary to conduct the general correspondence of the Society with individuals and associate bodies in foreign countries.

2. Domestic Corresponding Secretary.—It shall be the duty of the domestic corresponding secretary to conduct the Society's general correspondence with individuals and associate bodies in the United States.

3. Both the foreign and domestic secretaries shall keep, in suitable books to be provided for that purpose, at the Society's rooms, true copies of all letters written by them respectively on behalf of the Society; and shall preserve, on proper files, at the said rooms, all letters received by them on the same account; and at each stated meeting of the Society or the Council, they shall respectively report their correspondence, and read the same, or such parts thereof as may be required.

4. In case of vacancy in the office of either of the corresponding secretaries, or in the absence or disability of either of these officers, the duties of both may be performed by the other corresponding secretary.

5. The Society may designate a particular officer, or appoint a committee to prepare a letter or letters on any special occasion.

6. Recording Secretary.—It shall be the duty of the recording

secretary to give due notice of the time and place of all meetings of the Society, and to attend the same. He shall keep fair and accurate minutes of the proceedings of the Society, and record the same, when approved, in the Society's Journal. He shall give immediate notice to the several officers and committees of the Society, of all votes, orders, resolves and proceedings of the Society affecting them or appertaining to their respective duties. He shall prepare a list of the members of the Society entitled to vote, to be handed to the tellers before the opening of the polls at each annual election. He shall officially sign and affix the corporate seal of the Society to all diplomas and other instruments or documents authorized by the Society or Council. He shall have charge of the corporate seal, charter, by-laws, records and general archives of the Society, except so far as they may be expressly placed under the charge of others. He shall certify all acts and proceedings of the Society, and shall notify the Council of the death, resignation or removal of any officer or member of the Society. He shall have charge of the rooms of the Society, and shall perform all such other and further duties as may from time to time be devolved upon him by the Society or the Council. He, together with the Council, shall have the charge and arrangement of the books, maps and collections belonging to the Society. He shall cause to be kept in the rooms of the Society a registry of all donations to the library or collections of the Society acknowledge their receipt by letter to the donors, and report the same in writing to the Society at its next stated meeting.

7. All documents relating to the Society and under the charge of the secretaries respectively, shall be placed in such depositories in the rooms of the Society as the Council may provide and designate for that purpose.

CHAPTER XIII.

TREASURER.

The Treasurer shall have charge of and safely keep all contracts, certificates of stock, securities and muniments of title belonging to the Society. He shall collect the dues and keep the funds of the Society, and disburse the same under the direction of the Council; and so often as the said funds in the hands of the treasurer shall amount to one hundred dollars, he shall deposit the same, in the

name of the Society, in some incorporated bank in the city of New York, to be designated for that purpose by the Council; and the said funds, thus deposited, shall be drawn out of the said bank on the check of the treasurer, countersigned by the chairman of the Council, and only for the legitimate and authorized purposes of the Society. The treasurer shall, previous to the annual meeting of the Society, prepare and submit to the Council, for audit, a detailed account of his receipts and disbursements for account of the Society during the past year; and which annual account, duly audited, he shall present, with his general report, to the Society at its annual meeting.

CHAPTER XIV.

COUNCIL.

1. The Council shall have the management and control of the affairs, property and funds of the Society, and shall designate an incorporated bank in the city of New York where the said funds shall, from time to time as they accrue, be deposited by the treasurer.

2. It may frame its own by-laws, not inconsistent with the charter or by-laws of the Society.

3. It shall appoint the necessary agents, clerks and servants of the Society, with such powers and duties, privileges and compensation as it may from time to time determine; and may at pleasure revoke such appointments, and make others in their stead.

4. It shall have power to fill, for the unexpired term, any vacancy that may occur in any of the offices of the Society.

5. It shall have power, at its discretion, to declare vacant the seat of any member of its own body (except the president and vice-presidents) who shall have been absent from its meetings for three successive months; and also by a vote of a majority of the whole Council to remove from its own body any member thereof for cause; but in such case it shall be the duty of the Council to report every such vacancy or removal to the Society, at its next stated meeting thereafter, when such cases shall be subject to review by the Society.

6. It shall not, without an approving vote of the Society, at a stated meeting thereof, make any contract whereby a liability in

amount above one thousand dollars may be incurred by the Society; nor without such vote make any sale or disposition of the property of the Society exceeding that sum in value.

7. The Council may, in its discretion, remit the initiation fee or annual dues of any member of the Society.

8. No member of the Council shall receive any salary or pecuniary compensation for his services.

9. The Council shall hold stated meetings for the transaction of business at least once in every month, except the months of July, August and September.

10. At all meetings of the Council, five members present shall constitute a quorum for the transaction of business.

CHAPTER XV.

GENERAL PROVISION AS TO DEBT.

No debt on account of the Society, beyond the funds in the treasury for its payment, shall for any purpose, at any time, be incurred; and if at any time it shall appear that there are resting upon the Society pecuniary obligations beyond the funds in the treasury for their liquidation, no appropriation of funds from the treasury whatever, except for the necessary current expenses of the Society, shall be made, until the said pecuniary obligation shall be fully discharged, or the funds necessary for their extinction shall have been set apart for that purpose.

CHAPTER XVI.

ALTERATION OF THE BY-LAWS.

No alteration in the by-laws of the Society shall be made unless openly proposed at a stated meeting of the Society, entered on the minutes, with the name of the member proposing the same, and adopted by the Society at a subsequent meeting, by a vote of two-thirds of the members present.

CHAPTER XVII.

ADOPTION OF THE BY-LAWS.

The foregoing are hereby adopted and declared to be the by-laws of the Society; and all by-laws of the Society heretofore adopted are hereby rescinded and declared to be null and void.

HONORARY AND CORRESPONDING MEMBERS AND FELLOWS.

HONORARY MEMBERS.

H. I. M. Dom Pedro, Emperor of Brazil.

Constantine, H. I. H., the Grand Duke, President of the Imperial Russian Geographical Society, St. Petersburg.

Dufferin, Right Honorable Frederick Temple Hamilton, Blackwood, Earl of, K P., G.C.M.G., K.C.B., F.R.S., London, England.

Elder, Sir Thomas, Adelaide, South Australia.

Ismail Pacha, H. H., ex-Khedive of Egypt, Cairo.

Layard, Austin Henry, D.C.L., London, England.

Baker, Sir Samuel White, Pasha, F.R.S., F.R.G.S., London, England.

Markham, Clements R., K.C.B., Secretary Royal Geographical Society, London, England.

McClintock, Sir Admiral Francis Leopold, LL.D., London, England.

Middendorff, Adolph Theodore von, Secretary of the Imperial Academy of Sciences of Russia, St. Petersburg.

Nares, Sir George S., R.N., K.C.B., London, England.

Nordenskjöld, Prof. A. E., Sweden.

Rawlinson, Major-General Sir Henry C., K.C.B., Vice-President Royal Geographical Society, London.

Struve, Professor Otto Wilhelm von, St. Petersburg.

Wilczek, Count H., Vienna.

CORRESPONDING MEMBERS.

Asbjorsen, P.C., Christiania, Sweden.

Abbe, Prof. Cleveland, Washington. D. C.

Alvord, General Benjamin, U. S. Army, Washington, D. C.

Arseniew, Georges, St. Petersburg.

Altamirano, Señor Don Ignacio, Mexico.

Ammen, Rear-Admiral Daniel, U. S. Navy, Washington, D. C.

Balfour, David M., Boston, Mass.

Baker, Commodore F. H., U. S. Navy, Norfolk, Va.

Baranda, Señor Joaquim, Mexico.

Basaraff, Ed. Ivon de, Stuttgart, Würtemberg.

Barclay, James T., M.D., Jerusalem, Syria.

Barnard, Henry, LL.D., Hartford, Conn.

Bartlett, John Russell, Providence, R. I.

Blackie, Walter G., Ph.D., F.R.G.S. Glasgow.

Botassi, Demetrius, Consul-General of Greece, New York.

Bastian, Dr. Adolph, Berlin.

Becker, Prof., M. A., Vienna.
Behm, Dr. E. Gotha.
Braine, Capt. D. L., U. S. N., Washington, D. C.
Brewer, Prof. Wm. H., New Haven, Conn.
Bright, John, M.P., London.
Bushnell, Rev. Albert, Gaboon, Equatorial Africa.
Chaix, Prof. Paul, Geneva.
Chandles, W., F.R.G.S., London.
Collins, Lieut. Frederick, U. S. Navy, Annapolis, Md.
Chambers, William, LL.D., Edinburgh, Scotland.
Draper, Lyman, Madison, Wis.
Fritsch, Hugo O., New York.
Gardiner, Prof. James T., Director, State Survey, Albany, N. Y.
Gilman, Prof. Daniel Coit, LL.D., Baltimore, Md.
Guyot, Prof. Arnold Henry, LL.D., Princeton, N. J.
Hague, J. D., New York.
Hancock, Prof. Wm. Neilson, LL.D., Dublin.
Hayden, Prof. F. V., Washington, D. C.
Hotchkiss, Major Fred., Staunton, Va.
Hitchcock, Prof. C. H., Ph. D., Hanover, N. H.
Hochstetter, Dr. Ferdinand von, Vienna.
Hosmer, Dr. George, New York.
Hough, Franklin B., M. D., Washington, D. C.
Humphreys, General A. A., U. S. Army, Washington, D. C.
Hunt, Prof. T. Sterry, LL.D., Boston.
Johnston, W. E., M.D., Paris.
Jackson, John P., Berlin.
Lacroze, Julius, C.E., Buenos Ayres.
Lamansky, Eugene von, St. Petersburg.
Lesseps, Ferdinand de, Suez, Egypt.
Lefroy, General Sir John Henry, B.A., London, England.
Luce, Capt. S. B., U. S. Navy, Newport, R. I.
Long, Col. C. Chaillé, New York.
McCartee, Divie Bethune, M. D., Tokio, Japan.
Malte-Brun, V. A., Hon. Secretary of the Geographical Society, Paris.
Mariscal, Señor Don Ignacio, Mexico.
Marsh, Hon. Geo. P., LL.D., Rome.
Martin, Rev. Wm. A. P., President Imperial College, Pekin, China.
Maury, Louis Ferdinand Alfred, Paris
Maunoir, Charles, Paris.
Morgan, Lewis H., Rochester, N. Y.
Mello, Dr. T. G. M., Rio Janeiro.
Morgan, Henry Jas., Ottawa, Canada
Naprstek, Vojta, Prague, Austria.
Nassau, Rev. R. H., Gaboon, Equatorial Africa.
Negri, Cristoforo, Turin, Italy.
Newmarch, William, Honorary Secretary Statistical Society of London.
Olañeta, Col. Jose de, S. N., Washington, D. C.
Ortiz, Señor Don Angel D., Seville, Spain.
Passmore, Frank B., C. E., New Zealand.
Packard, Prof. A. S., Jr., Providence, R. I.
Pacha, Ismail, Governor-General of the Soudan.
Poesche, Theodore, Washington, D. C.
Paralta, Señor Don Manuel M., Min. Res. Costa Rica, Washington, D. C.
Pumpelly, Prof. R., Newport, R. I.
Retiró, Viscount Bom, President Historical and Geographical Society, Rio Janeiro.
Rimondi, Don Antonio, Peru.
Rae, John, M.D., London, England.
Raymond, Capt. Charles W., U. S. Army, West Point, N. Y.
Roberts, Gen. W. M., New York.
Romero, Mathias, Mexico.

ROGERS, Rear-Admiral John, U. S. Navy.
ROTHROCK, J.T., M.D., Wilkesbarre, Pa.
ROHLFS, Gerhard, M.D.
SEQURO, Viscount Porto, Minister of Brazil at Vienna.
STONE, Gen. Chas. P., Cairo, Egypt.
SAINT-MARTIN, Vivien de, Paris.
SAPUCACHY, M. le Viscomte, Rio Janeiro, Brazil.
SCHLAGINTWEIT-SAKÜNLÜNSKI, Robt. von, Geissen, Germany.
SCHLAGINTWEIT-SAKÜNLÜNSKI, Hermon von, Munich, Germany.
SCHUMACHER, Herman A., M.D., Consul-General German Empire, New York.
SCHUMACHER, John, Altona, Germany.
SCHUYLER, Eugene, Constantinople.
SELFRIDGE, Com'r T.O., U. S. Navy, Washington, D. C.
SEYMOUR, Horatio, LL.D., Utica, N.Y.
STANLEY, Henry M., Africa.
STARRING, Gen. F. A., Paris.
STEVENS, Henry, LL.D., London.
STEERE, J. B., Hong-Kong, China.
TILLEY, Sir S., Ottawa, Canada.
VAN BENTHUYSEN, C. Albany, N. Y.
VAN CAMPEN, Samuel Richard, London.
WALKER, Gen. Francis A., New Haven, Conn.
WALLING, H. F., C. E., Washington, D. C.
WHEELER, Capt. G. M., U. S. Army, Washington, D. C.
WILLIAMS, S. Wells, LL.D., New Haven, Conn.
WRIGHT, Gen. Horatio G., U. S. Army, Washington, D. C.
WYMAN, Capt. R. H., U. S. Navy, Washington, D. C.
WYSE, Lt.-Com'dr, L. N. B., F.N. Paris, France.
YOUNG, Jess, F.R.G.S., Wisbeach, England.

FELLOWS.

CORRECTED TO DECEMBER 31ST, 1880.

Date of Election.	
1859	Arnoux, William H.
1859	Arnold, David H. (L. F.)
1859	Aymar, William. (L. F.)
1860	Acton, Thomas C.
1869	Auchmuty, Richard Tylden.
1871	Atterbury, Rev. Wm. W., D.D.
1872	Allen, Horatio M.
1873	Albert, Halpern.
1874	Alexander, Junius B.
1874	Arthur, Gen. Chester A.
1874	Auferman, August.
1874	Auchincloss, Henry B.
1874	Acker, David D.
1874	Avery, Samuel P.
1874	Amend, Bernhard G.
1874	Ascher, Adolph.
1874	Agnew, John T. (L. F.)
1874	Arnold, Richard.
1874	Allen, Henry Wilder.
1874	Amy, Henry.
1874	Agnew, Alexander McL.
1874	Adams, Charles Francis.
1874	Astor, W. W.
1874	Appleton, John A.

1874 Appleton, D. S.
1874 Anderson, Henry H.
1874 Alsop, William.
1875 Amsinck, Gustav.
1876 Andrews, Wm. L.
1876 Appleton, Nathan.
1878 Austin, Charles P.
1879 Austin, William.
1879 Astoin, Felix.
1879 Agostini, Joseph.
1879 Ashley, Lucius C.
1879 Agnew, Cornelius R., M.D.
1879 Ashley, Lucien S.
1879 Astor, John Jacob. (L. F.)
1880 Almy, Harvey S.
1880 Anthony, James L.

1852 Bancroft, George. (L. F.)
1852 Barney, Hiram. (L. F.)
1853 Brown, James M.
1853 Butler, Charles.
1856 Baker, Francis. (L. F.)
1856 Berry, Richard.
1856 Brevoort, J. Carson.
1859 Brown, James. (L. F.)
1859 Boorman, J. Marcus. (L. F.)
1859 Boardman, Andrew.
1859 Bernheimer, Isaac.
1859 Belmont, August. (L. F.)
1859 Barlow, S. L. M.
1861 Butterfield, Gen. Daniel.
1865 Banvard, John. (L. F.)
1865 Bellows, Rev. Henry W., D.D.
1868 Banks, David.
1868 Beckwith, N. M.
1868 Bennett, James Gordon.
1868 Bernheimer, Adolph.
1868 Bernheimer, Simon.
1868 Brady, John R.
1869 Bailey, Jas. Muhlenberg. (L. F.)
1869 Banyer, Goldsboro.
1869 Bickmore, Prof. A. S.
1869 Bierstadt, Albert.
1870 Butler, Cyrus.
1870 Botta, Prof. Vincenzo.
1870 Body, John E.
1870 Bishop, T. Alston. (L. F.)
1870 Bell, George.
1872 Bryce, James. (L. F.)
1872 Brown, Walston H.
1873 Bailey, N. P.
1874 Bishop, D. W. (L. F.)
1874 Bien, Julius.
1874 Beecher, Rev. Henry Ward.
1874 Bartlett, Willard.
1874 Bissinger, Philip.
1874 Barney, Newcomb C.
1874 Backus, Henry C.
1874 Ballin, Eugene S.
1874 Baldwin, Townsend B.
1874 Bates, Levi M.
1874 Barnes, John S.
1874 Barbour, Thomas (L. F.)
1874 Bonner, Robert.
1874 Bonn, William B.
1874 Bjerring, Rev. Nicolas.
1874 Barnard, Horace.
1874 Barnard, F. A. P., LL.D.
1874 Benjamin, John.
1874 Butler, Wm. Allen.
1874 Bartow, Morey H.
1874 Barr, William.
1874 Belding, Milo M.
1874 Buckley, Rev. Jas. M.
1874 Bookstaver, Henry W.
1874 Brownson, Lieut. W. H., U.S.N.
1875 Barney, Charles T.
1875 Beaman, Charles C., Jr.
1875 Bernheimer, J. A.
1875 Beckwith, Leonard F.
1875 Benjamin, E. B.
1875 Beekman, Gerard.
1875 Babcock, Gen. O. E., U.S.Army
1875 Brownell, Silas B.
1875 Burgess, William J.
1875 Brown, Vernon H.
1875 Barnes, William.
1875 Beste, Henry.
1875 Bredt, Ernest.
1875 Bedle, Joseph D.
1875 Belknap, Capt. Geo. E., U.S.N.
1875 Bowie, Augustus J., Jr.

1876 Bowne, Richard H.
1876 Burnett, Henry L.
1876 Buell, James.
1876 Banks, James L., M.D.
1876 Baldwin, Commodore Charles H., U.S.N.
1876 Brower, John.
1876 Billings, Frederick.
1876 Bellew, F. H. T.
1877 Booth, George.
1877 Bixby, Robert F.
1877 Börs, Christian.
1877 Briggs, Prof. Charles A.
1877 Blanchard, George R.
1877 Blatchford, Eliphalet W.
1878 Brodhead, Richard.
1878 Bliss, Cornelius N.
1878 Brown, G. Melville.
1878 Barton, Oliver Grant. (L. F.)
1878 Brown, Rev. Philip A. H.
1878 Brand, James.
1878 Brown, J. Warren.
1878 Brown, J. Romaine.
1879 Brady, James T.
1879 Babcock, Henry C.
1879 Bronson, Theodore B.
1879 Barattoni, C. A.
1879 Bowen, Gen. Edmund S.
1880 Bayard, Edward, M. D.
1880 Barker, Fordyce D.
1880 Bowers, Henry E.
1880 Beach, Miles.
1880 Bamberger, A. E.
1880 Banks, D. S.
1880 Bonnett, Charles P.

1852 Colton, Joseph H. (L. F.)
1855 Conkling, Frederick A. (L. F.)
1855 Cooper, Peter.
1856 Cooley, James E. (L. F.)
1856 Cooper, Edward.
1856 Crooks, Ramsey. (L. F.)
1863 Cary, William F. (L. F.)
1868 Catlin, N. W. Stuyvesant (L.F.)
1868 Cisco, John J.
1868 Chapman, Joseph H.
1869 Cullum, Gen. George W., U. S. Army. (L. F.)
1870 Conklin, William A.
1872 Corse, Israel.
1872 Conklin, Eugene E.
1872 Crawford, Gen. S. W., U. S. Army.
1872 Clark, E. V.
1872 Cox, Samuel S.
1873 Coster, Charles H.
1874 Cruickshank, James, LL.D.
1874 Connery, T. B.
1874 Cowdrey, N. A.
1874 Curphey, James.
1874 Campbell, Allan.
1874 Church, Col. George E.
1874 Chistern, F. W.
1874 Cockcroft, Jacob H. V.
1874 Chickering, Charles F.
1874 Comstock, Cornelius.
1874 Constable, James M.
1874 Ceballos, J. M.
1874 Carter, Walter S.
1874 Caswell, Wm. H.
1874 Crerar, John.
1874 Crocker, David.
1874 Cruikshank, Edwin A.
1874 Crosby, J. Schuyler.
1874 Coates, Isaac T., M.D.
1874 Cochrane, Capt. Henry Clay, U.S.M.C.
1874 Colgate, James B.
1874 Constantine, Andrew J.
1874 Constantine, John.
1874 Corning, Erastus.
1874 Cottenet, Francis.
1874 Cossitt, Frederick H.
1874 Coutan, Charles E.
1874 Conyngham, Wm. L.
1874 Crosby, Hiram B.
1874 Crocker, Geo. A.
1874 Crocker, Wm. Baylies.
1874 Chickering, George H.
1874 Carter, Oliver S.
1874 Carhart, Thos. F.
1874 Catlin, Julius, Jr.

1874 Cabot, Stephen.
1874 Colgate, Robert.
1874 Curren, Robert.
1875 Clendenin, J. W.
1875 Cameron, R. W.
1875 Cushman, W. F.
1875 Colgate, Bowles.
1875 Cooper, George C.
1875 Champlin, John D., Jr.
1875 Cassebeer, Henry A., Jr.
1875 Chittenden, S. B., Jr.
1876 Clarke, W. H.
1876 Cullum, Mrs. George W. (L. F.)
1876 Constable, Major A. G.
1876 Cornell, John B.
1876 Curtis, Benj. L.
1876 Curtis, Benjamin R.
1878 Cornwallis, K.
1879 Cooper, James G.
1879 Church, Simeon E.
1879 Clark, G. W. C.
1879 Coddington, Gilbert S.
1879 Caldwell, R. A., M. D.
1879 Childs, George W.
1880 Calvin, Delano C.
1880 Clark, Lester W.
1880 Chamberlain, J. A.
1880 Cohen, Maurice S.
1880 Collins, John C.
1880 Cormack, John A.
1880 Caverley, William.
1880 Camp, W. A.
1880 Clymer, Edward M.
1880 Cronly, John E.

1855 Daly, Chief-Justice C. P. (L. F.)
1855 Dunshee, Prof. Henry W.
1856 Douglas, Andrew E.
1856 Dodge, Wm. E.
1856 Dodge, Wm. E., Jr.
1856 Detmold, Wm., M.D.
1859 Dickerson, E. N.
1864 Detmold, Christian E.
1866 Darling, Wm. A.
1868 Dwight, Prof. Theo. W.
1868 Du Chaillu, Paul B.
1868 Dennis, Charles. (L. F.)
1868 Davies, Henry E.
1870 Dash, John B.
1870 Davies, Alexander J. (L. F.)
1870 Drowne, Henry T.
1870 Dinsmore, William B.
1871 Daly, Joseph F.
1873 De Peyster, Frederick. (L. F.)
1873 Delano, Franklin H.
1873 Dwight, James F.
1874 De Peyster, Gen. J. Watts. (L.F.)
1874 Diefendorf, Menzo.
1874 Davis, Noah.
1874 Dillon, Romaine. (L. F,)
1874 Dutilh, E.
1874 Downer, Samuel.
1874 Decker, Charles A.
1874 Delafield, M. L.
1874 Dana, Charles A.
1874 Draper, Frank E.
1874 Devlin, Jeremiah.
1874 Davidson, Stratford P.
1874 Donohue, Charles.
1874 Decker, John J.
1874 Del Monte, Leonardo.
1874 Du Bois, Wm. A.
1874 De Castro, Diego.
1874 Delmonico, L.
1874 Davis, John G.
1874 Dalrymple, Alexander.
1874 Dunscomb, Richard T.
1874 Dun, R. G.
1874 Defendorf, Wilson.
1875 Darrow, William.
1875 Davies, Julien T.
1875 Du Bois, Eugene.
1875 Donnelly, John J.
1875 Daniel, Edwin M.
1875 Davidson, Charles A.
1875 De Peyster, Frederic J. (L. F.)
1875 Delafield, Lewis L.
1875 Dommerick, L. F.
1876 Davis, Gilbert F.
1876 Drexel, Joseph W.

1877 Day, Henry M.
1877 Davis, Joseph Beale. (L. F.)
1877 Dorsheimer, William.
1878 Dana, Charles.
1878 Day, Gen. H., U. S. Army.
1878 Di Cesnola, Gen. L. B.
1879 Dahlgren, Charles B.
1879 Dodge, George E.
1879 Dana, Samuel B.
1880 Davis, Theodore M.
1880 Deane, John H. (L. F.)
1880 Dyckman, Isaac M.
1880 Du Bois, James G.
1880 Du Bois, Frederick N.
1880 Dash, Bowie.
1880 Dunn, John.
1880 Dexter, Henry. (L. F.)
1880 Deen, William M.

1853 Eyre, Henry S. P.
1859 Evarts, William M.
1864 Evans, Walton W.
1868 Emmet, Thomas Addis, M.D.
1872 Edwards, Jonathan.
1874 Ernst, C. W.
1874 Eaton, Dorman B.
1874 Eaton, D. Cady.
1874 Ewen, John, Jr.
1875 Eldridge, Titus B.
1875 Esterbrook, Richard, Jr.
1875 Ellis, John W.
1875 Elliott, John.
1875 Eimer, Charles.
1875 Ely, Richard S.
1875 Eads, Captain James B., C.E.
1876 Ellers, George Howard.
1877 Elderkin, John.
1878 Eno, John C.
1878 Ellis, John, M.D.
1878 Edson, Franklin.
1879 Everett, William.
1879 Earl, Ferdinand P.
1879 Elliott, Samuel.
1880 Eckert, Thomas T.

1854 Field, Cyrus W. (L. F.)
1856 Field, David Dudley.
1856 Field, B. H. (L. F.)
1857 Fish, Hamilton.
1859 Fogg, Wm. H. (L. F.)
1860 Field, Rev. H. M.
1864 Faile, Thomas H.
1868 Frohwein, Theobald.
1869 Furniss, William.
1869 Forsyth, Rev. John.
1871 Fliess, Wm. M.
1873 Freedman, John J.
1873 Fithian, Freeman J.
1874 Farragut, Loyall.
1874 Foshay, James W.
1874 Fabbri, Egisto P.
1874 Fellows, John P.
1874 Francklyn, C. G.
1874 Fleet, Oliver S.
1874 Fatman, Lewis.
1874 Fabbri, Ernesto G.
1874 Foster, Wm. R.
1874 Forman, Alexander.
1874 Fox, Baldwin N.
1874 Fougera, Edmund C.
1874 Fox, Austen G.
1875 Foulke, Thomas.
1875 Faile, Charles V.
1875 Fargo, James C.
1875 Fuller, Charles D.
1875 Ford, James B.
1875 Foote, Emerson.
1875 Fay, A. Goodrich.
1875 Folsom, George W.
1876 Fisk, Gen. Clinton B.
1877 Fiske, Andrew.
1877 Flagg, William J.
1878 Ferris, L. Murray, Jr.
1878 Fales, William E. S.
1879 Fellows, John R.
1879 Ferris, Robert M.
1880 French, Stephen B.
1880 Fairchild, George M., Jr.
1880 Fleitmann, Ewald.

1856 Greenwood, Isaac J.
1856 Guernsey, Egbert, M.D.

XUM

1857 Greene, John W., M.D. (L. F.)
1859 Griswold, George. (L. F.)
1860 Graham, James L. (L. F.)
1868 Gebhard, Wm. H. (L. F.)
1868 Gerry, Elbridge T. (L. F.)
1868 Green, Andrew H.
1868 Greene, Gen. G. S.
1869 Gilbert, Clinton.
1870 Graham, Gen. C. K.
1872 Gerard, James W.
1872 Grinnell, R. M. (L. F.)
1873 Gillmore, Gen. Q. A., U.S.A.
1873 Gedney, Frederick G.
1873 Glaubensklee, Theo. G.
1874 Gardner, Hugh.
1874 Green, John.
1874 Gunther, William Henry.
1874 Gunther, F. F.
1874 Gibert, Fred. E.
1874 Gibbs, Theodore K.
1874 Gottsberger, William S.
1874 Goodsell, James H.
1874 Galpen, Horace.
1875 Greene, Lieut. F. V., U.S.A.
1875 Gordon, Robert.
1875 Germond, Wellington.
1875 Greene, G. S., Jr., C.E.
1875 Garrison, Cornelius K.
1875 Gibson, James.
1875 Goepp, Charles.
1876 Gautier, Dudley G.
1877 Gaylord, Augustus.
1877 Guleke, H. F., M.D.
1878 Gillies, James W.
1878 Garrison, William R.
1879 Graves, Arthur B.
1879 Gebhard, Edward.
1879 Gay, Joseph E.
1880 Graeff, Albert I.
1880 Gorringe, Lt. Comdr. Henry H., U. S. N.
1880 Gunning, William J.
1880 Greer, Henry.

1856 Hewitt, Abram S.
1856 Hunt, Wilson G.
1856 Herring, Silas C.
1858 Holton, David P., M.D. (L. F.)
1859 Henderson, John C.
1859 Havemeyer, John C. (L. F.)
1864 Hammond, Henry B.
1868 Huntington, Daniel. (L. F.)
1868 Hurlbert, William H.
1868 Hoyt, David.
1868 Hoguet, Robert J.
1868 Hall, Elial F.
1868 Hayes, Isaac I., M.D.
1868 Hadden, John A. (L. F.)
1868 Hallock, Mrs. Frances.
1870 Hawkes, Prof. W. Wright.
1870 Havens, Charles G.
1870 Harrison, Prof. Thomas F.
1871 Hamilton, Alexander, Jr.
1871 Hand, Clifford A.
1872 Hammersley, John W. (L. F.)
1872 Hawkins, Dexter A.
1872 Holbrook, Levi.
1873 Havemeyer, Theo. A.
1874 Hamersley, A. Gordon. (L. F.)
1874 Hamersley, Louis C. (L. F.)
1874 Hancock, Gen. Winfield S., U.S.A.
1874 Hay, John.
1874 Hitchcock, Rev. Roswell D., D.D.
1874 Havemeyer, Hector C.
1874 Hoguet, Henry L.
1874 Hoyt, Oliver.
1874 Hurlbert, Henry A. (L. F.)
1874 Hutton, Benjamin H.
1874 Haydock, George G.
1874 Haines, John P.
1874 Hinton, John H., M.D. (L. F.)
1874 Hendricks, M. M.
1874 Hawk, Samuel.
1874 Hallgarten, Adolphus.
1874 Havemeyer, James.
1874 Holbrook, E. F.
1874 Hoe, Richard M.
1874 Harper, Nathan.
1874 Hunter, Charles F.
1874 Hendricks, Edmund.
1874 Hendricks, Joshua.
1874 Hawes, James W.

1874 Hatch, Rufus.
1874 Huntington, C. P.
1874 Hunter, Lieut. Edward, U.S.A.
1874 Hoyt, Harlow M.
1875 Hubbard, Prof. O. P.
1875 Howard, Thomas T., Jr.
1875 Hammond, Wm. A., M.D.
1875 Houston, Col. D. C., U.S.A.
1875 Heuer, Capt. Wm. H., U.S.A.
1875 Howell, Maj. Charles W., U.S.A.
1875 Hoadley, John C.
1875 Hughes, Wm. H. T.
1875 Hoppenstedt, G. L.
1875 Hanemann, John F.
1875 Howland, Meredith.
1875 Hyde, Henry B.
1875 Harper, P. J. A.
1875 Hazen, Gen. W. B., U.S. Army.
1875 Harris, Siegmund.
1875 Hun, Leonard G.
1876 Heminway, Albert G.
1876 Holt, Henry.
1876 Hallock, Henry W.
1876 Halsted, Major Geo. B.
1876 Hoare, W. Robert.
1876 Holman, Frank E.
1876 Hyde, Samuel N.
1876 Hoes, Wm. M.
1876 Hatfield, J. B. T.
1877 Houghton, Prof. Walter R.
1878 Howe, George S.
1878 Hermann, Henry.
1878 Hinman, Wm. K.
1878 Holden, Horace.
1878 Hitchcock, Hiram
1879 Hamilton, William G.
1879 Harris, Col. Robert.
1879 Hayes, A. A., Jr.
1879 Hamilton, Capt. F. B., U.S.A.
1880 Hall, Hayden H.
1880 Hagner, Gen. Peter V., U. S. A.
1880 Howard, William Lee.
1880 Hickox, Charles R.
1880 Hollinshed, George.

1859 Ireland, John B.

1874 Ives, Fred'k E.
1874 Iselin, Adrian, Jr.
1879 Inman, William H.
1879 Isham, Charles H.

1852 Jay, John. (L. F.)
1852 Jones, John D. (L. F.)
1868 Johnson, Henry W.
1868 Johnson, Hezron A.
1870 James, Fred'k P.
1871 Jones, Walter R. T.
1874 Judson, Wm. D.
1874 Janssen, Gerhard.
1874 Jesup, M. K.
1874 Jaffray, Edward S.
1874 Jenkins, Wm. L.
1874 James, D. Willis.
1874 Jameson, Joseph A.
1874 Jordan, Conrad N.
1874 Jones, George.
1874 Jaffray, Robert.
1876 Johnston, James W.
1876 Jones, John M.
1878 Jones, George H.
1878 Judson, Capt. J. A., C.E.
1879 Jay, William.
1880 Jones, Frederick W.
1880 Jewett, George L.
1880 Jenkins, Silvanus F.

1854 Kennedy, Robert Lenox.
1869 Kelly, Eugene.
1870 Kühne, Frederick.
1872 Kendrick, Col. H. L., U.S. Army.
1873 Kennan, George.
1874 King, Edward.
1874 Kearney, Joseph R.
1874 Kunhardt, Henry R.
1874 Kingsland, Wm. M. (L. F.)
1874 Kidder, Henry P.
1874 Kalbfleisch, Charles H.
1874 Knoedler, Julius.
1874 Keck, Thomas
1874 Kemp, William.
1874 Knower, John.
1874 King, David, Jr.

1875 Knapp, Herman, M.D.
1876 Knauth, Percival.
1877 King, Clarence.
1877 Kane, Gen. Thomas L.
1878 Kernochan, Jas. Lorillard. (L. F.)
1879 Kane, S. Nicholson.
1880 Kidder, A. S., M. D.
1880 Keene, James R. (L. F.)
1880 Krotel, M. Luther
1880 Kopper, Philip W.

1852 Livingston, Cambridge. (L. F.)
1857 Low, A. A.
1859 Lathers, Richard. (L. F.)
1868 Lawrence, Abraham R.
1869 Lawrence, John S. (L. F.)
1870 Loew, Frederick W.
1870 Lyman, Edward H. R.
1871 Letson, Robert S
1871 Larremore, Richard L.
1871 Lee, Ambrose.
1872 Libbey, William. (L. F.)
1873 Lydig, Mrs. P. M.
1874 Lathrop, F. S. (L. F.)
1874 Lauterbach, Edward.
1874 Livingston, Robert J. (L. F.)
1874 Langdon, Walter. (L. F.)
1874 Lorillard, Peter.
1874 Lord, George W. T.
1874 Lorillard, George L.
1874 Livingston, John A.
1874 Livingston, Robert E.
1874 Littlejohn, James.
1874 Lawton, Walter E.
1874 Lawrence, Jos. B.
1874 Leggett, Francis W.
1874 Le Comte, Joseph.
1874 Lewis, Walter H.
1874 Lawson, Leonidas M.
1874 Lane, George W.
1874 Lawrence, Samuel B.
1874 Lawrence, Effingham N.
1874 Lesher, Stephen R.
1875 Luff, George.
1875 Low, Seth.
1875 Lawrence, George N.

1876 Low, A. Augustus.
1876 Lindau, Leopold.
1877 Lockwood, Le Grand.
1877 Lindley, John.
1877 Latrobe, John H. B.
1878 Loubat, J. F., LL.D. (L. F.)
1878 Leon, Nestor Ponce de
1879 Levy, Augustus H.
1880 Lang, Alexander.
1880 Learned, Edward.
1880 Lee, William H.

1852 Myers, Col. T. Bailey. (L. F.)
1853 Moore, George H. (L. F.)
1856 Morgan, E. D.
1856 Monroe, Ebenezer.
1856 Manners, David S.
1859 MacMullen, John.
1859 Morrell, Wm. H. (L. F.)
1859 Moore, Frank. (L. F.)
1863 May, Lewis.
1863 Moore, W. H. H. (L. F.)
1864 Morton, Levi P.
1866 Morris, Robert R.
1868 Morrison, Henry.
1868 Moreau, John B.
1868 Martin, Isaac P.
1868 Marquand, Henry G.
1868 Marsh, Luther R.
1868 MacKellar, William.
1868 McClure, George.
1869 Moore, Henderson.
1870 Marbury, Francis F.
1870 Murray, D. Colden.
1870 Miles, Edward D.
1872 Myer, F. William.
1872 Matthews, Edward. (L. F.)
1872 Marié, Peter. (L. F.)
1873 Moore, C. B.
1874 Morris, Henry L.
1874 Mailler, W. H.
1874 Macy, William H.
1874 Marble, Manton.
1874 Morrison, Edward.
1874 Morgan, W. F.
1874 Miller, Philip S.
1874 McElligott, Henry R.

1874 Mott, Alexander B., M.D.
1874 Moir, James.
1874 Morgan, J. Pierpont. (L. F.)
1874 Maclay, Isaac W., C.E.
1874 Myers, John K.
1874 Martin, John M.
1874 McAlpin, David H.
1874 Merrall, William J.
1874 Moulton, Clarence F.
1874 Miller, Geo. Macculloch.
1875 Marshall, F. Pelham.
1875 Mitchell, Edward.
1875 Macy, Arthur.
1875 Marcus, Arnold.
1875 Meyer, Theo. F. H.
1875 Mott, Henry A., Jr.
1875 Michler, Gen. Nathaniel, U.S.A.
1875 Monheimer, Joseph A.
1875 Magoun, George C.
1875 Maclay, Moses B.
1875 Martin, Bradley.
1875 Meyer, L. H.
1875 McLanahan, Geo. William.
1876 Mitchell, W. Howard.
1876 Mitchell, Edwin P.
1876 Mattson, Morris, M.D.
1877 Morton, Wm. J., M.D.
1877 Matsell, George W.
1878 Morison, John C.
1878 Merrick, William H.
1878 Montant, Alphonse.
1878 Musgrave, Thomas B. (L. F.)
1878 Mason, Lieut. T. B. M., U.S.N. (L. F.)
1879 Marshall, William I.
1879 Mather, Frederick E.
1879 Motz, Ferdinand.
1879 Miller, John Bleecker.
1879 Monteith, James.
1880 Mills, D. O. (L. F.)
1880 Mann, Edward C., M. D.
1880 Mason, Thomas D.
1880 Mackenzie, Lieut. M. R. L., U.S.N.
1880 Morrison, James E.
1880 Massey, William M.

1859 Norrie, Adam. (L. F.)
1870 Neilson, William H.
1873 Neilson, Frederic.
1874 Nourse, Prof. J. E.
1874 Newell, John.
1874 Niles, William W.
1874 Nones, Alexander.
1874 Newcombe, Isaac B.
1875 Northrop, A. L.
1880 Nelson, William Jr.

1868 Ogden, Alfred.
1869 O'Conor, Charles.
1874 Ottendorfer, Oswald.
1874 Osgood, Franklin.
1874 Olyphant, Robert M.
1874 Oakley, E. Benedict.
1874 Owen, Frederick N.
1875 Otterbourg, Marcus.
1875 Ottiwell, John D.
1875 O'Connor, Thomas H.
1875 Opdyke, William S.
1876 Olmsted, Fred'k Law.
1876 Olmstead, Dwight H.
1877 O'Gorman, Richard.
1877 Ogden, Isaac C., Jr.
1878 Osgood, Prof. Howard.
1879 Osborn, Henry F.
1879 O'Gorman, Richard, Jr.
1879 O'Brien, Thomas.
1880 O'Shaughnessy, John W. (L. F.)

1852 Prime, Frederick. (L. F.)
1852 Poor, Henry V. (L. F.)
1852 Pierrepont, Henry E. (L. F.)
1855 Pierrepont, Edwards.
1857 Pyne, Percy R.
1859 Purser, George H.
1859 Prime, Fred'k E. (L. F.)
1860 Phelps, Royal. (L. F.)
1862 Phillips, George W.
1868 Powers, William P.
1868 Paulison, John P.
1868 Parton, James.
1871 Potter, Howard.
1871 Peabody, Charles A.
1872 Parish, Henry.
1873 Plum, Elias.
1874 Parker, Willard, M.D.

1874 Peake, William I.
1874 Peabody, Arthur J.
1874 Penfold, William Hall.
1874 Phelps, I. N.
1874 Phoenix, S. Whitney. (L. F.)
1874 Potter, Orlando B.
1874 Pondir, John.
1874 Popham, William H.
1874 Parsons, George W.
1874 Paris, Sherman.
1874 Pastor, Henry.
1874 Preble, John Q.
1874 Porter, John K.
1874 Packer, Elisha A.
1874 Powers, George J.
1874 Pellew, Henry E.
1874 Prichard, William M.
1875 Prentice, W. P.
1875 Pope, Gen. John, U. S. Army.
1875 Pfund, Anton.
1875 Peipers, Hugo.
1875 Porter, Gen. Horace.
1876 Perkins, George W.
1876 Parsons, Levi.
1876 Peet, William E.
1876 Plum, James R.
1876 Palmer, Gen. W. J.
1877 Prime, Rev. Wendell, D.D.
1878 Parsons, Edwin.
1878 Prescott, George B.
1879 Peck, Prof. Myron Griffin.
1880 Pinchot, James W.
1880 Powell, Wilson M.

1854 Ruggles, Samuel B.
1854 Rutherford, L. M.
1856 Randolph, Anson D. F.
1856 Remsen, William. (L. F.)
1856 Riker, John H.
1859 Rapallo, Charles A.
1859 Reckendorfer, Joseph. (L. F.)
1861 Rogers, C. B. (L. F.)
1868 Raven, Anton A.
1868 Rose, Cornelius.
1872 Robbins, Chandler. (L. F.)
1873 Reinhart, B. F. (L. F.)
1874 Reid, Whitelaw.
1874 Rives, Francis R.
1874 Richard, Auguste.
1874 Rogers, H. Livingston.
1874 Riker, William J.
1874 Requa, James M.
1874 Reynes, Jaime.
1874 Renauld, Peter A. H.
1874 Rhoades, John H.
1874 Ramsey, Charles G.
1874 Ransom. F. A.
1874 Rhoades, Lyman.
1875 Roosevelt, Clinton.
1875 Rives, G. L.
1875 Roberts, Nathan B.
1875 Read, J. Meredith.
1875 Rose, Charles.
1875 Rosenfeld, Isaac.
1876 Ross, William B.
1877 Rose, Theodore.
1877 Rice, A. Thorndike.
1877 Roome, William P.
1878 Rogers, Charles H.
1878 Roorback, Orville A.
1878 Rainey, Thomas, M.D.
1878 Robinson, Thomas H.
1879 Redmond, James Morton.
1879 Rhinelander, Miss J. (L. F.)
1880 Robinson, Mrs. John A. (L. F.)
1880 Robinson, Henry J.
1880 Radcliffe, Henry G.

1853 Smith, James O., M.D.
1854 Sewell, Henry F.
1855 Stuart, Robert L.
1856 Stebbins, Henry G.
1856 Spofford, Paul N.
1856 Schermerhorn, Wm. C.
1856 Sherman, W. Watts.
1859 Schell, Augustus. (L. F.)
1859 Schultz, John H. (L. F.)
1860 Stout, Francis A. (L. F.)
1868 Seward, Clarence A.
1868 Shea, George.
1869 Savage, John. (L. F.)
1869 Strebeigh, Robert M.

1870 Schell, Richard. (L. F.)
1870 Sherwood, John.
1870 Schafer, Samuel M.
1870 Schafer, Simon.
1870 Seligman, James.
1870 Seligman, Jesse.
1870 Stoughton, Charles B.
1871 Shaler, Gen. Alexander.
1871 Swan, William H.
1872 Stern, Myer.
1872 Stengel, Prof. Frederick.
1872 Steiger, E.
1872 Stuyvesant, Rutherfurd. (L. F.)
1873 Smith, James M.
1873 Slevin, Thomas E.
1873 Sturges, Frederick.
1873 Spencer, James C.
1873 Scott, Julian. (L. F.)
1873 Southworth, Alvan S. (L. F.)
1873 Sturgis, Frank K. (L. F.)
1874 Stone, Henry.
1874 Sands, Harry M.
1874 Steinway, William.
1874 Storrs, Charles. (L. F.)
1874 Sands, Philip J.
1874 Smith, Samuel Drake.
1874 Sloan, Samuel.
1874 Schermerhorn, F. Augustus.
1874 Stuyvesant, Robert R.
1874 Scott, Col. Henry L.
1874 Scudder, Henry J.
1874 Stuart, Joseph.
1874 Swarr, David M.
1874 Stokes, James.
1874 Strong, W. L.
1874 Steward, D. Jackson.
1874 Stevens, Alexander Henry.
1874 Sherman, Benjamin B.
1874 Shethar, Samuel.
1874 Sheafe, J. F.
1874 Schieffelin, Samuel B.
1874 Scott, Thomas A.
1874 Stiger, William E.
1874 Stillwell, Benjamin M.
1874 Sawyer, Warren.
1874 Sands, Andrew H.
1874 Schaus, William.
1874 Simpkins, N. S., Jr.
1874 Spinney, Joseph S.
1874 Salomon, Edward.
1874 Sewell, Robert.
1874 Striker, J. A.
1875 Stanford, William H.
1875 Smith, Lewis Bayard.
1875 Smith, Charles Stewart.
1875 Stewart, Col. Charles S., U S.A
1875 Sturges, Henry C.
1875 Schultz, Carl H.
1875 Stone, Charles Francis.
1875 Sandford, Elliott. (L. F.)
1875 Stranahan, J. S. T.
1875 Schofield, Gen. John M., U.S.A.
1875 Schieffelin, H. Maunsell.
1875 Schack, Fred.
1875 Sherman, Isaac.
1875 Sibley, Gen. Henry H., U.S.A.
1875 Schiff, Jacob H.
1875 Strazburger, Oscar.
1875 Schlesinger, Alfred.
1875 Smith, Apollos.
1875 Smith, Augustine.
1876 Schem, Prof. Alexander J.
1876 Smith, Harsen H.
1876 Sibley, Hiram W.
1876 Spaulding, Henry F.
1876 Smith, Dwight, M.D.
1876 Stryker, Gen. William S.
1876 Stone, A. B.
1877 Schuyler, Philip
1877 Shearman, William P.
1877 Sanford, Henry S.
1877 Sanger, Major Joseph P., U.S.A.
1877 Schaff, Rev. Philip, D.D.
1878 Scott, James.
1878 Stewart, William Rhinelander.
1878 Slocum, J. J.
1878 Sanford, A. Wright.
1878 Sands, William R.
1878 Smith, S. Newton.
1878 Smull, W. P.
1878 Sabla, Theodore de Joly de.
1879 Saltus, Edgar Evertson.

1879 Simion, Leonhard.
1879 Smith, Herbert H.
1879 Stone, R. C.
1879 Speir, Francis, Jr.
1879 Stevens, Frederick W. (L. F.)
1879 Smith, E. Reuel. (L. F.)
1879 Shields, Prof. Charles W.
1879 Stetson, Francis Lynde.
1879 Squires, Grant.
1879 Spencer, Mrs. Catherine L. (L.F.)
1880 Saville, H. M., M. D.
1880 Southwick, Henry K.
1880 Starr, Theodore B.
1880 Suydam, John R., Jr.
1880 Smythe, Henry.
1880 Syle, Rev. E. W., D. D.
1880 Stark, L. J. N.
1880 Sabin, Joseph.
1880 Stokes, George H.
1880 Savery, Bartlett M.
1880 Shepherd, Sherringham A.

1855 Tellkampf, T. A., M.D.
1856 Tiffany, Charles L.
1856 Townsend, Randolph W.
1859 Tracy, Charles.
1868 Taylor, Douglas.
1868 Tilden, Samuel J.
1870 Tuckerman, Lucius.
1870 Thomson, James.
1872 Tower, Gen. Z. B., U. S. Army.
1872 Tracy, William.
1872 Tyler, Arthur W.
1874 Thompson, David G. (L. F.)
1874 Tiemann, Peter C.
1874 Tefft, Erastus T.
1874 Thorne, Jonathan.
1874 Tousey, Sinclair.
1874 Trevor, John B.
1874 Taylor, Alfred J.
1874 Thorne, William H.
1874 Turner, Herbert B.
1874 Terry, Com'r Edward, U.S.N.
1875 Taintor, Charles M.
1875 Thurber, Francis B.
1875 Terry, Gen. Alfred H., U.S. Army.
1875 Toel, William.
1875 Terbell, Henry S.
1876 Tappan, J. Nelson.
1876 Trenchard, Edward.
1876 Totten, Lieut. George Mansfield, U. S. Navy.
1876 Terry, Rev. Roderick.
1877 Thomas, T. Gaillard, M.D.
1877 Tillinghast, William H.
1877 Talcott, James. (L. F.)
1877 Tucker, Rev. William J., D.D.
1878 Taylor, Rev. Wm. M., D.D.
1879 Thompson, J. P.
1879 Turnbull, Robert J.
1880 Tailer, William H.

1876 Uhl, Herman.

1854 Viele, Gen. Egbert L.
1868 Van Santvoord, C.
1869 Vanderpoel, Aaron J.
1870 Van Brunt, Charles H.
1874 Voorhis, William.
1874 Vanderbilt, William H.
1874 Vincent, Frank, Jr.
1874 Vyse, Thomas A., Jr.
1874 Van Volkenburgh, P.
1874 Van Rensselaer, K.
1874 Vail, Henry F.
1875 Vance, Samuel B. H.
1875 Van Buren, John D., Jr.
1875 Valentine, Lawson.
1875 Von Post, H. C.
1875 Vanderpoel, A. Ernest.
1875 Verhuven, Henry F.
1875 Von Dorrien, S.
1876 Van Hoesen, George M.
1876 Van Brunt, Cornelius.
1877 Vanderbilt, Cornelius.
1877 Voorhees, Charles H.
1878 Vanderbilt, William K. (L. F.)
1878 Voorhis, John R.
1879 Vilas, Royal C.
1880 Van Hesse, Christern.
1880 Van Alen, James H.
1880 Van Tassel, Frank S.

1854 Webb, William H.
1854 Wetmore, Samuel. (L. F.)
1854 Witthaus, G. H. (L. F.)
1856 Westermann, B.
1859 Ward, George Cabot. (L. F.)
1860 Winston, Frederick S.
1866 Wendell, Jacob.
1868 White, Alexander M.
1869 Ward, Gen. Elijah.
1869 Weber, Leonard, M.D.
1870 Webster. Sidney.
1870 Wilson, Gen. James Grant. (L. F.)
1870 Wright, E. Kellogg.
1870 Weston, Theodore, C.E.
1870 Ward, T. W.
1872 Wetmore, Wm. Boerum. (L. F.)
1872 Williams, Stephen C. (L. F.)
1872 Wells, Jacob.
1873 Weiner, Joseph, M.D. (L. F.)
1874 Weyman, Charles S.
1874 White, Lt.-Com. H. C., U.S.N.
1874 Waite, Chief-Justice M. R.
1874 Wheeler, Everitt P.
1874 Wadsworth, Julius.
1874 Wallack, J. Lester.
1874 Wetmore, George P. (L. F.)
1874 Willets, Samuel.
1874 Wyckoff, Jacob F.
1874 Williamson, David B.
1874 Wilder, Marshall P.
1884 Wilkeson, Samuel.
1874 Walraven, Ira E.
1874 Wooster, George H.
1875 Work, J. Henry.
1875 Wheeler, John V.
1875 Willard, Lieut. J. H., U.S.A.
1875 White, Charles Trumbull.
1875 Wilson, Gen. J. H.
1875 Wilcox, Franklin A.
1875 Wilkes, George.
1875 Warner, Lewis T., M.D.
1875 Windmuller, Louis.
1875 White, David, C.E.
1875 Winslow, Gen. Edward F.
1875 Waller, Prof. Elwyn.
1875 Whitehead, Com'r Wm., U.S.N.
1875 White, Loomis L.
1875 Wissman, J. F.
1876 Ward, Roswell B.
1876 Walker, Evan T.
1876 Wedemeyer, A. J. D.
1876 Wrigley, Henry E., C.E.
1877 Ward, W. S.
1877 Waters, James T.
1877 Woodruff, Col. D., U.S.A.
1878 Whitehead, Henry M.
1878 Witherbee, S. H.
1878 Wells, John W.
1878 Wood, Isaac F.
1878 Watson, William.
1878 Whittemore, Charles.
1878 Whittemore, Thomas W.
1879 Williams, Richard P.
1879 Watson, Francis A. (L. F.)
1879 Woodbury, Charles H.
1879 Wirths, Maurice.
1879 Wilcoxson, George.
1879 Wolfe, Miss Catherine. (L. F.)
1880 Ward, Samuel. (L. F.)
1880 Williams, R., Jr.
1880 Wilson, James.

1871 Youngs, Henry I.
1874 Young, Mason.
1875 Yoshidi, Kiyonari.
1879 Yates, Ellis Samuel.
1880 Young, William.

1874 Zachos, Prof. J. C.
1875 Zollikoffer, Oscar.

FELLOWS DECEASED, 1880.

1874 Adams, Rev. William.
1856 Brown, Stewart.
1860 Benedict, Erastus C.
1868 Bill, Edward.
1868 Blake, Charles F.
1856 Colgate, Charles C.
1856 Curtis, Chief-Justice Wm. E.
1862 Cowdin, Eliot C. (L. F.)
1874 Clark, Lot Curran.
1875 Childs, Calvin G.
1876 Day, Lieut. Murray S., U.S.N.
1869 Field, Dudley.
1868 Gambrill, C. D.
1878 Gescheidt, Mrs. A.
1872 Hoffman, William B.
1874 Haldeman, S. S.
1859 Lenox, James.
1869 Mount, Richard E. (L. F.)
1870 Myer, Gen. A. J., U. S. Army. (L. F.)
1874 Neergaard, William.
1874 Peckham, Walton H.
1868 Roberts, Marshall O.
1874 Riley, Charles V.
1875 Robinson, Henry E.
1870 Sistare, George K.
1870 Seligman, Joseph.
1874 Squires, Robert.
1874 Worth, James L.
1874 Waite, Charles C.

List of Foreign and Domestic Geographical and other Scientific Bodies with whom this Society is in communication and constant exchange of publications.

Academia Real das Sciences, Lisbon, Portugal.
Academy of Natural Sciences, Philadelphia, Pa.
Academy of Natural Sciences, Davenport, Iowa.
Academy of Sciences, St. Louis, Mo.
Academy of Natural Sciences, Minneapolis, Minn.
American Antiquarian Society, Worcester, Mass.
American Naturalist, Salem, Mass.
American Social Science Association, Detroit, Mich.
Astor Library, New York.
Biblioteca National, Rio Janeiro, Brazil.
Boston Society of Natural Sciences, Mass.
Bureau of Education, Washington, D. C.
Caucasian Geographical Society, Tiflis, Russia.
Central Bureau of Statistics, Stockholm, Sweden.
Circolo Geografico Italiano, Turin, Italy.
Commissão Central Permanente de Geographia, Lisbon, Portugal.
Cornwall Library, Cornwall-on-the-Hudson, N. Y.
Cosmos; Guido Coro, Turin, Italy.
Essex Institute, Salem, Mass.
Etablissement Geographique de Bruxelles, Belgium.
Ferdinandeum in Innspruck, Austria.
Geographical Society, Lyons, France.
Geographical Society, Rio Janeiro, Brazil.
Geographical Society, Hamburg, Germany.
Geographical Society, Amsterdam, Holland.
Geographical Society, Marseilles, France.
Geographical Society, Munich, Germany.
Geographical Society, Dresden, Germany.
Geographical Society, Hermannstadt, Austria.
Geographical Society, Copenhagen, Denmark.
Geographical Society, Bremen, Germany.

Geographical Society, Madrid, Spain.
Geographical Society, Weimar, Germany.
Geographical Society, Bombay, India.
Geographical Society, Quebec, Canada.
Geographical Society, Metz, Germany.
Geographische Anstalt, Gotha, Germany.
Geological Society, Edinburgh, Scotland.
Geological Survey, Montreal, Canada.
Gesellschaft für Erdkunde zu Berlin, Germany.
Gewerbeschule, Bistritz, Austria.
Historical Society, Iowa City, Iowa.
Historical Society, Madison, Wis.
Hungarian Academy of Sciences, Pesth, Hungary.
Hydrographic Office, London.
Imperial Russian Geographical Society, St. Petersburg.
Imperial Royal Academy of Sciences, Vienna.
Imperial Geographical Society, Vienna.
Instituto Historio Geografico del Rio de la Plata, Buenos Aires, S. A.
Institut Geographique International, Berne, Switzerland.
Kais. Königl. Geologische Reichsanstalt, Vienna.
Königl. Gesellschaft der Wissenschaften, Göttingen, Germany.
König-Sächs. Gesellschaft der Wissenschaften, Leipzig, Germany.
L'Exploration, Paris.
Library of Congress, Washington, D. C.
Library Department of State, Washington, D. C.
Literary and Philosophical Society, Liverpool.
Literary and Philosophical Society, Manchester, England.
Literary and Historical Society of Quebec, Canada.
Melbourne Observatory, Melbourne, Australia.
Ministère de l'Agriculture, de l'Industrie et du Commerce, Rome, Italy.
Museo Nacional de Mexico, Mexico.
Mexican Geographical and Statistical Society, Mexico.
Natural History and Philosophical Society, Belfast, Ireland.
Nature, London.
Naval Institute, Annapolis, Md.
Naturforschende Gesellschaft, Emden, Germany.
N. Y. State Museum of Natural History, Albany.
N. Y. State Library, Albany.

Philosophical Society, Wellington, New Zealand.
Polymathic Society, Vannes, France.
New York Academy of Sciences, New York.
Pulkowa Observatory, Pulkowa, Russia.
Real Academia Española Arqueologica y Geografica, Madrid, Spain.
Revue de Geographie, Paris.
Revue Geographique, 37 Rue Scheffer, Paris.
Roumanian Geographical Society, Bucharest.
Royal Geological Society, Dublin, Ireland.
Royal Society of Victoria, Melbourne, Australia.
Royal Danish Academy of Sciences, Copenhagen, Denmark.
Royal Geographical Society, London.
Royal Academy of Sciences, Munich, Germany.
Royal Society of Sciences, Upsala, Sweden.
Royal Prussian Statistical Bureau, Berlin.
Royal University, Christiania, Norway.
Royal Society, London.
Royal Cornwall Polytechnic Society, Cornwall, England.
Royal Academy of Sciences, Brussels, Belgium.
Royal Institute for Philology, Geography and Ethnography of Dutch India, The Hague, Holland.
Royal Dutch Meteorological Institute, Utrecht, Holland.
Royal Hungarian University, Pesth, Hungary.
Royal Asiatic Society, London.
Section of the Imperial Russian Geographical Society, Orenburg.
Smithsonian Institution, Washington, D. C.
Sociedade de Geographia, Lisbon, Portugal.
Société de Geographie, Geneva, Switzerland.
Société de Geographie, Rochefort, France.
Société Belge de Geographie, Antwerp, Belgium.
Società Geografica Italiana, Rome.
Société de Geographie, Paris.
Société Khediviale de Geographie, Cairo, Egypt.
Société Belge de Geographie, Brussels, Belgium.
Société des Sciences Naturelles, Cherbourg, France.
Société de Geographie Commerciale, Bordeaux, France.
Société Normande de Geographie, Rouen, France.
Société de Geographie de Montpelier, France.

Société Suisse de Topographie, Geneve, Switzerland.
Society of Natural Sciences, Buffalo, N. Y.
Statistical Society, London.
Statistische Amt des Deutschen Reichs, Berlin
The Academy, London.
The Asiatic Society, Yokohama, Japan.
The Japan Gazette, Yokohama, Japan.
Poughkeepsie Society of Natural Science, Poughkeepsie, N. Y.
Toukiyan Geographical Society, Tökio, Japan.
U. S. Geological Survey, Washington, D. C.
United States Coast Survey, Washington, D. C.
Verein für Erdkunde, Darmstadt.
Verein für Geographie und Naturwissenschaften, Kiel, Germany.
Verein von Freunden der Erdkunde, Leipzig, Germany.
Victoria Institute, or Philosophical Society of Great Britain, London.
Zeitschrift für Geographie, Lahr, Baden, Germany.

ADDITIONS TO LIBRARY AND MAP-ROOMS OF THE SOCIETY DURING THE YEAR 1880.

Purchases.

Nebraska, by Edwin A. Curley, New York, 1876 ; Alaska, and Missions on the North Pacific Coast, by Rev. Sheldon Jackson, New York, 1880 ; Adventures in Patagonia, by Rev. Titus Coan, New York, 1880 ; The Constitution of Man, by George Combe, Hartfort, 1841 ; Air and Rain, by Robert A. Smith, London, 1872 ; Mandalay to Momien, by Edward B. Sladen and Horace Brown, London, 1876 ; The Depths of the Sea, by C. Wyville Thomson, London, 1873 ; Jamaica in 1850, by John Bigelow, New York, 1851 ; A Journey in Egypt, by Thomas Legh, Philadelphia, 1817 ; European Life, by an Artist, Philadelphia, 1858 ; Geography, by J. Cowley, Dublin, 1878 ; Voyage of the Paper Canoe, by Nathaniel H. Bishop, Boston, 1878 ; A Forbidden Land, by Ernest Oppert, New York, 1880 ; A Lady's Life in the Rocky Mountains, by Isabella L. Bird, New York, 1879–80 ; Voyage dans les Mers de L'Inde, par M. Le Gentil, Paris, 1779 ; A New Account of East India and Persia, by John Fryer, London, 1698 ; Four Months in a Sneak-Box, by Nathaniel H. Bishop, Boston, 1879 ; Rebellion in 1745, by James Ray, Whitehaven, 1753 ; Nouvelle Géographie Universelle (Vol. V.) par Elisée Reclus, Paris, 1879 ; St. Thomas, W. I., by John P. Knox, New York, 1852 ; A Sketch of the Military and Political Power of Russia, New York, 1817 ; Excursions, Voyages and Travels in America, Europe, Asia and Africa, by George Rapelje, New York, 1834 ; The Practical Navigator, by John Hamilton, London, 1794 ; Principles of Geography, by Malte-Brun, Edinburgh, 1834 ; Le Monde Terrestre, par Charles Vogel, Paris, 1880; Europäische Staaten-Kunde von Otto Krümmel, Leipzig, 1880 ; A View of the Coast, etc., within the limits of the South Sea Company, by Herm. Moll, London, 1711 ; Im Reiche des Muata Jamwo von Paul Pogge, Berlin, 1880 ; Die geographische Erforschung des Afrikanischen Continents von Phil. Paulitschke, Wien, 1879 ; Lima, by Manuel A. Fuentes, Paris, 1866 ; Description of the City of New York, James Hardie, New York, 1827 ; History of the

Island of Dominica, by Thomas Atwood, London, 1791 ; Canadian Pacific Railway, by Sandford Flemming, Ottawa, 1874 ; State of Vermont, by George Nichols, Montpelier, 1878 ; Gazetteer of the State of Pennsylvania, by Thomas F. Gordon, Philadelphia, 1833 ; Gazetteer of Virginia, by Joseph Martin, Charlottesville, 1835 ; Our Future Highway to India, by Verney Lovett Cameron, London, 1880 ; Through Asiatic Turkey, by Grattan Geary, London, 1878 ; The Transvaal of To-Day, by Alfred Aylward, Edinburgh, 1878 ; Travels among the Lakes and Mountains of Eastern and Central America, by Fred. Elton, London, 1879 ; The River of the Golden Sand, by Capt. William Gill, London, 1880 ; The Arctic Voyages of A. Erik Nordenskjöld, 1858–79, London, 1879 ; Wanderings in Patagonia, by Julius Beerbohm, London, 1879 ; Up the Amazon and Madeira Rivers, by Edward D. Mathews, London, 1879 ; Stanford's Comp. of Geography, London, 1878 ; Dictionary of Greek and Roman Geography, by various writers, London, 1879 ; The Cyclopædia of India, edited by Edward Balfour, Madras, 1871–73 ; A History of Ancient Geography, by E. H. Bunbury, London, 1879 ; Pérou et Bolivie, par Charles Wiener, Paris, 1880 ; Die Erde und ihre Völker von Fredrich von Hellwald, Stuttgart, 1877–78 ; Die heutige Türkei von Fredrich von Hellwald und L. C. Beck, Leipzig, 1878-79 ; Reisen in Indien und Hochasien von Hermann von Schlagintweit-Sakünlünski, Jena, 1880; Geographisches Jahrbuch, von E. Behm, Gotha, 1866–78; Voyage au Cambodge, par L. Delaporte, Paris, 1880; Le Kohistan Le Ferghahan et Kuldja, par Ch. E. de Ujfalvy, Paris, 1878; Reizen maar Nederlanesch Nieuw Guinea door, P. J. B. C., Robidé van Der Aa, Sgravenhage, 1879 ; Fusang, or the Discovery of America, by Charles G. Leland, New York, 1875 ; Pre-Historic Nations, by John Baldwin, N. Y., n. d.; Ancient America, by John Baldwin, N. Y., 1871; The Life of Christopher Columbus, by John S. C. Abbott, N. Y., n. d.; Viking Tales of the North, translated by Rasmus B. Anderson, and others, Chicago, 1877; America Discovered by the Welsh in 1170, by Rev. Benjamin F. Bowen, Philadelphia, 1876; Pre-Historic Races of the U. S. of America, by J. W. Foster, Chicago, 1878; A History of the Character and Achievements of the so-called Christopher Columbus, by Aaron Goodrich,

New York, 1874 ; The Younger Edda, by Rasmus B. Anderson, Chicago, 1880; Norse Mythology, by R. B. Anderson, Chicago, 1879; The Island of Fire, by Rev. P. C. Headley, Boston and New York, n. d.; America not Discovered by Columbus, by R. B. Anderson, Chicago, 1877; New England's Memorial, by Nathaniel Morton, Boston, 1855; Parkman's Historical Works, Boston, 1878 79; Life in South Africa, by Lady Barker, Phil., 1877; The Land of the Czar, by O. W. Wahl, London, 1875; A Hand-Book for Travellers in Denmark, Norway, etc., London, 1858; A Yacht Voyage in 1856, by Lord Dufferin, Boston, 1859; Cuba with Pen and Pencil, by Samuel Hazard, Hartford, 1871; New Tracks in North America, by William A. Bell, London, 1869 ; Unbeaten Tracks in Japan, by Isabella L. Bird, London, 1880; Picturesque Holland, by H. Havard, London, 1876; The Heart of Holland, by H. Havard, London, 1880; L'Année Géographique, Paris, 1880.

Periodicals.

Petermann's Mittheilungen, Das Ausland, Revue de Géographiè, Deutsche Rundschau für Geographie und Statistik, Zeitschrift für wissenschaftliche Geographie, Le Globe, Cosmos, L'Exploration, Annales de l'Extrême Orient, Nature, The Academy, The American Naturalist, Geografisk Tidskrift, Revue Géographique, Le Tour du Monde and others.

Gifts.

Meteors, by William Lackland, New York, 1870; Morse's Geography, Edition of 1794; The Danish Islands, by James Parton, Boston, 1869; Twentieth Annual Report of the Regents of the University of the State of New York, Albany, 1868; The Way to avoid the Centre of our violent Gales, by George W. Blunt, New York, 1866; Annals of the Lyceum of Natural History of New York, 1872-74; Value of Spanish America to the United States, by General Carlos Butterfield, New York, 1868; Croquis de l'itinéraire

suivi de la côte au lac Tanganyka, par M. Cambier, Brussels, n. d.; A Map of a Portion of Central Africa, by Dr. Livingstone, from his own surveys between the years 1866 and 1873; Maps of Utah Territory, compiled by Chr. Mahon, J. H. Renshawe and others, Washington, 1878; Europa: Verzameling van Uit-En Inlandsche Lettervruchten, ter Bevordering van Wereldkennis in Aangenaam Onderhood, Dortrecht, 1838. *Chief Justice Charles P. Daly.*

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PART I.

TRANSACTIONS

OF THE

SOCIETY FOR THE YEAR 1880.

XUM

TRANSACTIONS OF THE SOCIETY FOR 1880.

Annual meeting held at Chickering Hall, corner of Eighteenth Street and Fifth Avenue, New York, on Tuesday evening, January 13th, Chief-Justice DALY, President of the Society, in the chair.

The reading of the minutes of the previous meeting was, on motion, dispensed with.

The following named individuals, on the recommendation of the Council, were declared duly elected members of the Society:

Fellows.—Maurice Mauris, Frederick W. Jones, Delano C. Calvin, Thomas T. Eckert, Edward Bayard, M. D., Theodore M. Davis, Mrs. John A. Robinson, Alexander Lang, George L. Jewett, H. M. Saville, M. D., Hayden H. Hall, Edward Learned, John H. Deane, Gen. Peter V. Hagner, U. S. A., Henry E. Bowers and Isaac M. Dyckman.

Corresponding Member.—Sir S. Filley, Ottawa, Canada.

The Treasurer, Mr. Levi P. Morton, read his annual report, showing a cash balance to the credit of the Society, in the general fund, of $754.10, and in the permanent fund of $8,724.66. The report was accepted and ordered on file.

The Committee on Nominations presented the following report:

The Nominating Committee appointed to select officers to fill vacancies, under resolution of the Society passed at its meeting, December 9th, 1879, respectfully report the selection of the following nominees for election, in accordance with chap. 5, sec. 2 of the by-laws:

FOR PRESIDENT—Charles P. Daly, LL.D., term to expire January, 1881.

FOR VICE-PRESIDENT—Roswell D. Hitchcock, D. D., term to expire January, 1883.

FOR FOREIGN CORRESPONDING SECRETARY—J. Carson Brevoort, term to expire January, 1882.

FOR RECORDING SECRETARY—Elial F. Hall, term to expire January, 1883.

FOR TREASURER—Levi P. Morton, term to expire January, 1881.

FOR COUNCILLORS—T. Bailey Myers, Walton W. Evans, Isaac

I. Hayes, Egbert L. Viele, W. W. Astor, terms to expire January, 1883. William H. Morrell, term to expire January, 1881.

Respectfully,

(Signed) CLINTON ROOSEVELT (Chairman),
JOHN E. BODY,
MARSHALL O. ROBERTS,
Nominating Committee.

The above report was, on motion, unanimously adopted.

The Society then proceeded to a ballot, which resulted in the unanimous election of the above-given ticket.

Mr. Benjamin Robbins Curtis, of Boston, was introduced and read an interesting account of "A Journey Around the World," which was illustrated by 160 stereopticon views of America, Japan, China, Java, Ceylon, India, Egypt, Italy and France.

On motion of Prof. Thomas F. Harrison, the thanks of the Society were tendered to Mr. Curtis, and a copy of his paper was requested for publication.

On motion, the Society adjourned.

Meeting of February 10th, held at Chickering Hall, New York. Chief-Justice Daly in the Chair.

The reading of the minutes of January 13th was, on motion, dispensed with.

The following named gentlemen, on the recommendation of the Council, were declared duly elected members of the Society:

Fellows.—Fordyce D. Barker, Bowie Dash, Harvey S. Almy, James G. Du Bois, Frederick N. Du Bois, Lester W. Clark, A. S. Kidder, M. D., Christian Von Hesse, D. O. Mills, and Henry R. Southwick.

Corresponding Member.—General Sir J. Henry Lefroy, B. A., London, England.

Prof. John B. McMaster, of Princeton College, read a paper entitled "The Bad Lands, or *Mauvaises Terres* of Wyoming," illustrated with stereopticon views.

The thanks of the Society were extended to Prof. McMaster for his valuable paper, and a copy of it was requested for publication

On motion, the Society adjourned.

Special meeting of February 27th, held at No. 11 West 29th Street (the rooms of the Society), New York, for the reception of M. de Lesseps.

Meeting of March 23d, held at Chickering Hall, New York, Gen. George W. Cullum, U. S. Army, Vice-President, in the chair.

The reading of the minutes of the previous meetings, February 10th and 27th, on motion, dispensed with.

The following named gentlemen, on the recommendation of the Council, were declared duly elected members of the Society.

Fellows.—Theodore B. Starr, Henry J. Robinson, John R. Suydam, Jr., John Dunn, J. A. Chamberlain, Miles Beach, Henry Smythe, and William H. Tailer.

Chief-Justice Daly, LL.D., President of the Society, was introduced, and delivered his "Annual Address upon the Geographical Work of the World in 1878 and 1879," illustrated with stereopticon views.

The thanks of the Society, on motion, were given to Chief-Justice Daly, and a copy of his very able address requested for publication.

On motion, the Society adjourned.

Meeting of April 26th, held at Chickering Hall, New York.

Chief-Justice Daly in the chair.

The reading of the minutes of the previous meeting, March 23rd, was, on motion, dispensed with.

The following named gentlemen, on the recommendation of the Council, were declared duly elected members of the Society.

Fellows.—Stephen B. French, Edward C. Mann, M. D., Albert I. Graeff, and Thomas D. Mason.

Rev. Edward W. Syle, D. D., read a paper upon "Japan as it Is."

On motion, a copy of Dr. Syle's paper was requested for publication.

The Society, on motion, adjourned.

Meeting of May 25th, held at Chickering Hall, New York.

General George W. Cullum, U. S. Army, Vice-President, in the chair.

The reading of the minutes of the previous meeting, April 26th, was, on motion, dispensed with.

The Rev. B. F. De Costa was introduced, and read a paper upon "Arctic Exploration—Ancient and Modern." It was illustrated with stereopticon views.

On motion, the thanks of the Society were extended to Mr. De Costa for his able paper, and a copy of it was requested for publication.

On motion, the Society adjourned.

Meeting of October 28th, held at Chickering Hall, New York, for the reception of Lieutenant Frederick Schwatka, U. S. Army, and his associates of the Franklin Search Party of 1878-'79-'80.

Chief-Justice DALY in the chair.

The reading of the minutes of the previous meeting, May 25th, was, on motion, dispensed with.

The following named gentlemen, on the recommendation of the Council, were declared duly elected members of the Society:

Fellows.—James W. Pinchot, George M. Fairchild, Jr., Rev. E. W. Syle, D. D., A. E. Bamberger, Henry Dexter, John W. O'Shaughnessy, and Lieutenant-Commander H. H. Gorringe, U. S. Navy.

Addresses were then made by Chief-Justice Daly, Lieutenant Frederick Schwatka, U. S. Army, and Dr. Isaac I. Hayes. (See

Part II., pp. 237–296. BULLETIN, No. 4, 1880.)

On motion, the Society adjourned.

Meeting of November 18th, held at Chickering Hall, New York. Chief-Justice Daly in the chair.

The reading of the minutes of the previous meeting, October 28th, was, on motion, dispensed with.

The following named gentlemen on the recommendation of the Council were declared duly elected members of the Society.

Fellows.—Maurice S. Cohen, William Lee Howard, William Young, Samuel Ward, James R. Keene, John C. Collins, Charles R. Hickox, Ewald Fleitmann, D. S. Banks and R. Williams, Jr.

Corresponding Member.—Colonel José R. de Olanēta, Military Attaché to the Spanish Legation, Washington, D.C.

The Rev. Owen Street was introduced, and read a paper upon "The Changes in the Physical Geography of the Ancient Home of Man in Central and Western Asia."

On motion of Hon. Edwards Pierrepont and seconded by Rev. Roswell D. Hitchcock, the thanks of the Society were given to Mr. Street for his very valuable paper, and a copy of it was requested for publication.

On motion, the Society adjourned.

Meeting of December 23rd, held at Chickering Hall, New York. Chief-Justice Daly in the chair.

The reading of the minutes of the previous meeting, was, on motion, dispensed with.

The following named gentlemen, on the recommendation of the Council, were declared duly elected members of the Society.

Fellows.—Lieutenant M. R. S. Mackenzie, U. S. Navy, Joseph Sabine, William H. Lee, M. Luther Krotel, George H. Stokes, George Hollinshed, Bartlett M. Savery, James Wilson, General James H. Van Alen, William J. Gunning, James E. Morrison, John

A. Cormack, William Caverly, William M. Massey, Henry G. Radcliffe, Sherringham A. Shepherd, Wilson M. Powell, Henry Greer, W. A. Camp, Edward M. Clymer, William Nelson, Jr., L. J. N. Stark, John E. Cronly, Phillip W. Kopper, James L. Anthony, William M. Deen, Silvanus F. Jenkins, Frank S. Van Tassell and Charles P. Bonnett.

The President, upon motion, appointed Professor Theodore W. Dwight, Chairman, Dr. James O. Smith and Mr. N. P. Bailey, as the Nominating Committee, to select suitable candidates for officers of the Society, under Chap. V., sec. 2, of the By-Laws and to report at the Society's annual meeting, in January, 1881.

Mr. Elial F. Hall offered the following resolutions, which were unanimously adopted.

Resolved, That in the death of Chief-Justice William E. Curtis this Society has lost one of its most active and efficient members and officers. His varied learning and attainments, his fondness and aptitude for those studies which we cultivate, his Christian kindness and courtesy and generous liberality, united with his wise and discriminating judgment and sound advice in critical emergencies in past years connected with the administration of the affairs of this Society, have contributed largely to its present prosperity, and his memory will long be cherished among us with reverence, affection and gratitude.

Resolved, That the foregoing resolution be entered upon the minutes and a copy thereof transmitted to the family of our late associate.

Mr. Thomas Davidson, M. A., of Boston, was introduced, and read a paper on "The Recent Excavations and Discoveries at Athens and Olympia." It was illustrated with stereopticon views.

On motion, the thanks of the Society were given to Mr. Davidson, and a copy of his paper was requested for publication.

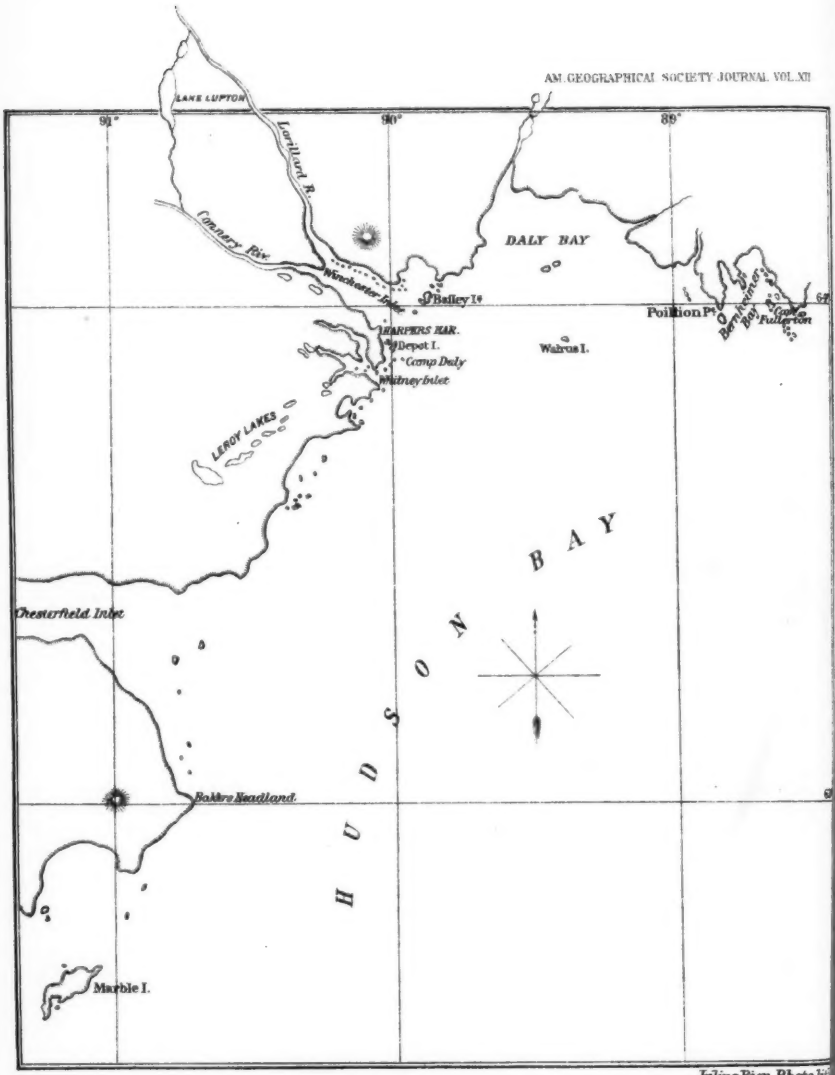
On motion, the Society adjourned.

Part II.

PAPERS READ BEFORE THE SOCIETY

DURING 1880.

Note.—The Authors alone are Responsible for the Contents of their Respective Papers.



Lieut. Schwatka's Chart of his Survey of the Coast of North Hudson's Bay

Franklin Search Expedition

ANNUAL ADDRESS

OF

CHIEF JUSTICE DALY, LL.D.,

PRESIDENT OF THE SOCIETY.

Geographical Work of the World in 1878 & 1879.

INTRODUCTION.

Before entering upon an account of the geographical work of the world during 1878 and 1879, I would call attention to the great increase during the last few years of geographical societies. Eight have been formed within the last two years alone, and there are now throughout the world fifty-one of these organizations; the last two being one in Algeria and one in Japan. Our own society is the fifth in the number of members, though, as respects its annual revenue and ability to aid in the work of geographical exploration, it is much below bodies in Europe inferior to it in point of numbers. The oldest is the French Geographical Society of Paris, established in 1821; the largest and the most influential are the Royal Geographical Society of London, which has 3,337 members, and an annual income of about $40,000, and the Imperial Geographical Society of St. Petersburgh, with an annual income of about $33,000, $12,000 of which is contributed by the Russian government.

The ample revenue of the most efficient of these bodies does not depend solely, as in our Society, upon the payment of a fixed sum annually by the members, but is augmented by governmental aid, or by a fund derived from

bequests or gifts by intelligent persons who have appreciated what these bodies accomplish, in opening up to trade, commerce and civilization unknown, or imperfectly known, parts of the earth. Our Society has never received any pecuniary aid from government, state or national; and, so far, it has never occurred to any one to leave us, by bequest, or to give us, representing as we do so large and influential a country, any sum of money to enable us to aid as we ought to do in the great work of geographical exploration and discovery.

Large sums are given in this country to found or endow colleges, to create or aid charitable institutions, or to establish observatories to enlarge the range of astronomical knowledge. I am the last to find fault with this large-minded liberality, especially to question the utility of aiding astronomical enquiries, but I cannot help thinking that it is quite as important to be thoroughly acquainted with the world that we inhabit as it is to become better informed of the myriads of worlds that are revolving around us. There is a large portion of the earth that is yet unknown. There are great and fruitful regions that, if opened up to general intercourse, would greatly add to the wealth of the world, create new pathways for trade and commerce, and facilitate the disposition of the manufactures and other products of the industry of civilized races. Nothing has contributed to do this more efficiently than the organized efforts of geographical societies. It is not only by what they are able to do in sending explorers to unknown regions but, by the influence they exercise upon public opinion and upon governments that the work of exploration and discovery is kept up as it has been during the last quarter of a century.

As long as there remains large portions of the earth to be discovered or more fully explored, the same reasons apply that existed when, in the fifteenth century, the first steps were taken which produced that great movement in favor

of maritime exploration and discovery that led to the circumnavigation of Africa and the discovery of America. It had its origin in what was substantially the same thing in its effect as the modern geographical society. It was brought about by Prince Henry of Portugal bringing together in the establishment which he founded upon the promontory of Sagres, on the southwestern extremity of Portugal, a number of men interested in geographical enquiries, to advise, consult, and project what should be done, to obtain a knowledge of what were then the unknown parts of the earth. It is to his and their labors in this early geographical society for twenty-three years, or up to the end of his life in 1460, that we owe the fact that America was discovered; and it is to the interest created by the action of geographical societies, since their institution in 1821, more than to anything else, that we owe the peopling of Australia and of New Zealand; the opening up of the great regions in Northern Asia, including China and Japan; the extensive explorations that have been made in Africa, so that the centre of that continent is no longer what it was a quarter of a century ago—a blank upon the map—as well as the exploration of our own great western territories, a work to promote and keep up which this Society devoted all its powers, at a time when the nation and the government were alike insensible to the importance of it; and the whole country is now realising the result in the large metallic wealth that has been discovered, and the valuable regions previously unknown, that have been opened up and partially settled. Surely this is as useful a work to promote by gifts or bequests as it is to endow colleges.

When Prince Henry, surnamed the Navigator, established his school—or, as I may properly call it, geographical society—upon the lonely promontory of Sagres, he adopted as his motto, "Talent de bien faire," which, as the words were then understood, meant the desire to be useful; and this motto expresses to-day the object and aim of geographical societies.

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What they accomplish may not be directly traceable to them in every exploration or discovery, but it is the consequence of their pioneer efforts. The field of geographical labor is so diversified, it involves the accumulation of such enormous details and such continuous and infinite labors in the use of the details, that it is not possible to point out in advance what can be accomplished. It can be seen only in the results, and those results, as the history of geographical exploration and discovery for the last quarter of a century proves, have been far greater than the most sanguine expectation of those who first set on foot the enquiries.

With a very limited revenue, derived from the annual fee incident to membership, we have not been able to do our full share in this great work, though we have, in view of our resources, done a great deal. Through the liberality of a small number of our members, we have now a house of our own, in the most eligible part of the city, which, I am happy to say, is paid for, at least with the exception of a very small amount, which we are able at any time to discharge. The policy, adopted a few years ago, of encouraging by the payment of $100 life fellowships, for the establishment of a permanent fund, the income only of which is devoted to the use of the Society, has been most successful; that fund now amounting to over $9,000. Members duly appreciating the utility of this policy, as the best means of securing the permanency of the Society and extending its usefulness, have already, to a considerable number, become life members by the payment of $100 each, and I trust that all who feel an interest in the great work to which the Society is devoted will become life fellows, as I am convinced that this will prove one of the most efficient means for its permanency and increased utility in the future. One of our aims was to establish in this commercial and maritime metropolis of the North American continent an institution where reliable information could be obtained of every

part of the habitable globe, and it is to this, in the past, that the surplus funds of the Society have been chiefly devoted by the accumulation of a geographical library, and as full a collection of maps and charts, of every part of the world, as it was in our power to obtain. We have now a geographical library which numbers more than 14,000 volumes. In the diversified character of it, embracing as it does works of travel and exploration in every part of the globe, the most desirable scientific treatises, many rare works, and an unusually large collection of atlases, beginning with the first atlas by Ortelius, in 1570, and extending in a continuous chain down to the present time, we have a geographical library equal to any that exists in any country. Our collection of maps and charts, however, though the largest in this country, is by no means what it ought to be, and is greatly inferior to that of the Royal Geographical Society of London. It is a department in which inquiries are constantly made, and that requires a considerable expenditure to keep it up. Geographical societies in Europe receive from governments, gratuitously, large numbers of maps and charts, and are not put to the expenditure that we are in procuring this most important means of information; but if our permanent fund should be considerably augmented, as I trust it will be, by life memberships, we will be able to devote an amount to this purpose which will greatly augment our collection, and make it what the incessant demands upon it show that it ought to be. It will be agreeable for you to know that persons come from all parts of the United States to consult our collection of maps, who very generally find, although not always, what they have long been searching for, and warmly express their appreciation of the utility of the Society.

I will close this branch of my subject by saying that after a long struggle to build the Society up, we may congratulate

ourselves upon the fact that its permanency as a national institution is now assured, although a great deal is yet to be done to make it what it should be, and which will be done, as our means increase. We are now, however, firmly enough established to be able to say that we can carry out Prince Henry's motto of "Talent de bien faire," the ability to be useful.

GENERAL GEOGRAPHICAL WORK.

I shall begin my account of the labors of the last two years by referring to that branch of geographical work which relates to the earth generally.

COMPLETION OF THE MEASUREMENT OF AN ARC OF THE MERIDIAN.

Among the most interesting results in this general field of enquiry, is the completion of a work to which I have frequently called attention—the measurement of a new arc of the meridian. This work, which has been going on for several years, was instituted by the governments of France and Spain, for the measurement of an arc of the meridian by a system of triangles, extending from the northernmost of the Shetland Islands, in 61° N. lat., to the borders of the great desert of Africa, south of Algeria, to the 34° N. lat. and was successfully completed last September. The great difficulty was to extend the line of triangulation across the Mediterranean from the coast of Europe to the coast of Africa, which, after many failures, was finally accomplished by means of the electric light. The vapors of the Mediterranean proved so impervious to the rays of the electric light, that to produce sufficient intensity it was necessary to construct an electro-magnetic apparatus, propelled by steam-engines. After twenty days of repeated efforts and failures, the electric

light, from Tetica, in Spain, became visible to the eye on the African coast like a round, reddish disk on the horizon; and on the following day the electric light from Mulhacen, in Spain, was seen, and the work was accomplished, so that we now possess a meridian arc of 27 degrees, the greatest ever measured on the earth's surface.

PROPOSED COMMON MERIDIAN.

Several attempts have been made during the past few years to get the different nations of the world to agree upon a common meridian, instead of having each adhering to its own, like the meridians of Greenwich, Paris, Washington, &c. The meridian of Greenwich has been most generally accepted, for the reason that it is a very good line of division; and as the English are a leading nautical nation, the meridian of Greenwich is the one found most extensively upon maps and charts. For these practical reasons we have, in this country, generally been disposed to adhere to it, and would probably be quite willing, as a nation, to unite in its adoption. But when the question of doing so arose in the Geographical Congress at Antwerp, the disposition of the French members was to adhere to the meridian of Paris, and as it seems to be difficult to get one nation to adopt the meridian of any other, the object might be effected by adopting a common meridian solely upon geographical grounds. In this view, M. de Beaumont, President of the Geographical Society of Geneva, recommends that the initial or first meridian should be one passing through Behring's Straits. This meridian, M. de Beaumont suggests, can be very easily connected with work based on the principal meridians of Greenwich, Paris, Ferrol and Washington. It would touch the extremity of the American continent at Cape Prince of Wales, and traverse, on the one hand, the whole length of the Pacific,

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without touching any land; and on the other, all Europe through its centre, from the top of Spitzbergen, passing Copenhagen, Leipzig, Venice and Rome; and from thence cutting the African continent from Tripoli to Cape Frio, about 18° S. lat. M. de Beaumont urges, as advantages, that it would cut Europe into east and west, thus giving a division which has been tacitly recognized for ages, and that it presents about the largest terrestrial arc from 79° N. lat. to 18° S. lat., or 97° altogether; thus giving to science the longest continuous line of lands as a basis for astronomical, geodetic and meteorological observations, and other scientific researches. Passing as it would through a great number of states, it would become really an international meridian, as each nation might establish a station or observatory on the line of it.

As this would be, for the reasons above suggested, a very desirable first meridian, and as there appears to be no other way of getting over the disposition of nations to adhere to their own and of avoiding the confusion of having so many, I fully concur in M. de Beaumont's suggestion, and hope, as a practical relief from an existing difficulty, that it may hereafter be generally adopted. There is in my opinion so much good sense in the suggestion, that I think, in the course of time, the merit of it will become so fully recognized, that the force of public opinion, in each nation, will ultimately lead to the adoption of a line in which all can agree, without interfering with any national preference.

UNSURVEYED COASTS OF THE WORLD.

Lieutenant G. Temple, R. N., has recently called attention to the large portion of the coasts of the world that are still unsurveyed. He has pointed out that this is the fact in respect to a large part of the coast of South Africa, and especially the dangerous shore on the eastern portion of the Cape of Good

Hope where so many vessels have been wrecked and thousands of lives lost; also to parts of the eastern and western coasts of South America and on the Pacific side of Central America; the coasts of many of the islands of the Pacific, and of the Australian colonies; coasts in the Chinese seas, and in the routes between Australia, China and Japan; on the west coast of the peninsula of Siam, the inner channels of the Red Sea, parts of the Mediterranean and of the northern coasts of America and Hudson Bay. Here is a large work yet to be done in the interests of commerce, and which should be done by the naval vessels of the commercial nations of the world.

LOST ISLAND.

Doctor W. Fraser has ascertained from an unpublished work, containing maps of the French cartographer Tassin, that an island, named in the map Brazil, existed when the map was made on the western coast of Ireland, off the entrance to Galway Bay, which must afterwards have sunk beneath the ocean, there being nothing now in the same spot but a comparatively small rock, with its head projecting above the waters, and two banks indicated, one of which is sunken and the other is the present projecting rock, the whole being known upon the present charts as Porcupine bank.

INGENIOUS REPRESENTATION OF THE EARTH AND SOLAR SYSTEM.

Signor N. Perini, of London, has constructed an ingenious piece of mechanism to show the arrangement and movement of the whole solar system. The upper part of an ordinary room is constructed as a blue dome, fourteen feet in diameter and fourteen high, sprinkled with stars, and around the base of the dome the constellations are ar-

ranged which form the zodiac. Suspended from the dome by a narrow tube is an opal globe, lighted with gas, representing the sun. From almost invisible wires the planets, with their various moons, and Saturn with his rings, are suspended around the sun at their appropriate distances, each having the proper inclination to the plane of its orbit, the earth being about the size of a walnut. By simply turning a key, the whole planetary system is set in motion. The sun turns upon its axis; the earth, by an ingenious watchwork arrangement inside, turns also upon its axis, as does the moon, around it; and all the planets move in their proper elliptical orbits in relatively proportional time.

The moving power is clockwork; not a sound, however, is heard, but the whole moves in solemn silence. The entire mechanism can be made sufficiently small to adapt it for instruction in schools. It can be easily taken to pieces, does not get out of order, and shows better than anything heretofore devised the immense difference between the length of the years of the earth and those of the outer planets.

PHYSICAL GEOGRAPHY.

In the department of scientific geography, especially in physical geography, valuable contributions have been made by those particularly devoted to these branches of inquiry.

RESULTS OF THE SCIENTIFIC VOYAGE OF THE CHALLENGER AROUND THE WORLD.

Sir Wyville Thompson has given some interesting information, as the results of investigations made by him, chiefly in connection with facts ascertained in the scientific voyage of the *Challenger* around the globe. He finds that many of the physical conditions of the globe depend

upon the fact of a division of it into two hemispheres: one embracing nearly the whole of the dry land, and the other a hemisphere almost entirely covered with water. He fixes the centre of what he calls the land hemisphere somewhere about the middle of Great Britain, and of the water hemisphere in the neighborhood of New Zealand. He calls the vast expanse of water which has its centre in the southern part of the globe the great ocean of the world—of which the Atlantic, with the Arctic Sea and the North Pacific, are merly gulfs, extending northward. In his opinion, the principal cause of the movements of great masses of water is the trade winds, and that their modifications and counter-currents are the cause of all the movements. He says that the latest investigations show that all the vast mass of water, which is often two thousand fathoms in thickness, which lies below what he calls the neutral band, moves slowly northward; and that evaporation is greatly in excess of precipitation over the northern portion of the land hemisphere than it is over the great water's hemisphere, especially in the southern portion of that hemisphere. He says it is now thoroughly established, by soundings taken in all directions, that the average depth of the ocean is about two thousand fathoms, and that in all probability it nowhere exceeds five thousand fathoms; that depths beyond four thousand fathoms are very rare, and generally exist in the form of deep pits in the neighborhood of volcanic islands. He states that in all the ocean basins there are depressions extending over considerable areas where the depth reaches at least three thousand fathoms; that from three to four hundred miles from the shore, whether in deep or shallow water, formations are being laid down from the disintegration of shoals or rocks on the coasts; that, in depths of about two thousand fathoms, there is the *globigerina ooze*, formed of the shells of living organizations that existed on the surface of the sea, and sunk with the death of the

amimal to the bottom; that this ooze occupies a large part of the bed of the Atlantic, considerable portions of the bed of the Pacific and of the southern seas, and that it resembles chalk; but that below three thousand fathoms no such accumulations have taken place—not a shell reaching the bottom—the carbonate of lime being entirely dissolved by the carbonic acid in the long descent of the shell; that in these deep abysses, which occupy an area of not less than ten millions of square miles, the sounding instruments bring up an extremely reddish clay, apparently the decomposition of submarine volcanoes and of decomposed organisms, and that this deep deposit is taking place with extreme slowness; that what is at present forming at the great depths of the ocean does not correspond either in structure or chemical composition with any known geological formation, and warrants the belief that none of the older formations of the globe were laid down at such great depths; and finally, he adopts the opinion of Professor Dana, of Yale College, that the eruptions which originated the mountain chains that form the skeleton of our present continents, and the depressions occupied by our present seas, arose from the cooling and contraction of the crust of the earth at a period more remote than the deposition of the earliest fossiliferous rocks.

Dr. Kroll, of Gottingen, has also been engaged in investigating the depth of the ocean and estimates the mean depth at 1,877 fathoms, an estimate not very much below that of Sir Wyville Thompson.

An event that occurred in the Falkland Islands last year will indicate how rapidly changes will take place on the earth's surface. In East Falkland, at the back of the town of Stanley, there is a range of heights surmounted by a large plateau, which enclosed an immense bog of peat, the growth or development of many centuries. This island is destitute of trees, and through some influence of the climate

which is peculiarly favorable to the production of peat, every kind of plant, over the whole surface of the land, is gradually converted into this substance, which becomes so solid when dry that it will hardly burn. In the autumn of 1878 a southeasterly storm was attended by an immense rainfall, the effect of which was to loosen this immense deposit of peat and to saturate it so thoroughly that the whole of it ultimately came down the mountain sides with the velocity of half a mile an hour and moved into the sea.

METEOROLOGY.

There is no branch of geographical science which, during the past few years, has made greater progress, or that is more important, than meteorology. There are no laws a knowledge of which is more useful to man than those which bring about atmospheric changes, particularly to the agriculturist and the mariner. The effect, moreover, of atmospheric conditions upon health and disease render all inquiries upon this subject of the highest importance, not only in the treatment of, but in guarding against diseases.

The study of the weather hitherto by farmers, mariners, and others affected especially by it, has been a mere matter of indivdiual observation, and it was long doubtful whether it could ever be otherwise. It has now, however, become a matter of science, chiefly through the instrumentality of the telegraph; and the certainty with which great changes may be predicted, and the movements of storms indicated in advance, would a quarter of a century ago have been deemed incredible. In no branch of science have difficulties been more completely overcome which appeared to be insurmountable, or results obtained of more practical importance, and yet we are but in the very infancy of this inquiry. The fact that the New York *Herald* has so frequently been able to transmit to Europe

by the telegraph intelligence in advance of the approach of storms moving towards the western coast of Europe, and to indicate their direction, is one of the most remarkable things in the history of science. In view of its practical utility, it is to be ranked amongst the greatest of modern achievements, and I do not think that we yet fully realize what has been done, or are prepared to anticipate what will be achieved in the future. I have already sufficiently detailed, in previous addresses, the nature of the work of our own Signal Service Bureau at Washington, which has become pre-eminent for its ability and its accuracy, as well as the co-operative work of like organizations now extending largely over Europe. It is only necessary, therefore, to say that during the past two years this efficient work has been continued, inspiring additional confidence in its value, and that a remarkable feature in the work of our own bureau at Washington has been a series of charts based upon the state of the barometer, the thermometer, and of the weather generally, in different parts of the globe. This route is so arranged that the observations at different places—for instance, at Washington, London, St. Petersburg, Constantinople—are not taken in the four cities at the same local clock time, but at precisely the same moment, the observer and readers in the several cities being all actually at their instruments at once.

SEVERITY OF RECENT WINTERS IN EUROPE.

The past two years have been distinguished by exceptional and very marked changes of the ordinary temperature in different parts of the world, particularly in Western Europe, in certain parts of Asia, and in the eastern portion of the United States. It has been marked in Europe by winters of increased severity and an undue prevalence of moisture in the spring and summer, attended by very disastrous consequences to agriculture in Great Britain, France, and some other countries. The last winter on the

European continent, as well as in Great Britain, has been one of the severest upon record. In France the thermometer has never been as low since 1795, with the exception of one year, 1871, when the cold, however, was but of short duration.

In Switzerland and South Germany, especially in the mountainous parts, the severity of the winter has been exceedingly disastrous, frequent instances occurring of men, women, children and domestic animals being frozen to death. In this part of Europe the last has been the severest winter known for half a century; while in this country the winters, especially the present winter, has been one of unusual mildness in all the States east of the Mississippi.

EXCESSIVE DROUGHTS AND GREAT SNOWFALL IN ASIA.

In Asia the changes in the ordinary temperature have been equally remarkable. In some parts disastrous effects have been produced from excessive moisture, but most generally from the opposite, or long periods of draught which diminished in a large degree the production of the fruits of the earth, and which was attended in Persia, India and in certain parts of China by terrible famines.

In the mountains of Cashmere there was a snowfall last winter extraordinary even in that mountainous region. In certain places it snowed uninterruptedly and heavily for ten continuous days, the snow upon the level plains being from thirty to forty feet deep, and in some of the mountain passes it was piled up to a height of one hundred and fifty feet, and in others to two hundred and fifty feet. The earth was torn from the hillsides and precipitated into the valleys in the spring by the weight of the descending avalanches. The destruction of wild animals was very great. Even the bears were kept so long shut up in their winter homes by the masses of snow that most of them perished from hunger—a very unusual circumstance, as the

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bear is the denizen of regions of ice and snow, and makes his way and lives where other animals cannot.

Various conjectures have been advanced as to the cause of this unusual change of temperature. A writer in the New York *Herald* attributes the fact that the spring and summer in Europe was excessively rainy to an unusually vigorous movement of the Gulf Stream, in consequence of an exceptional pressure of the southeast trade winds, which he claims produced an extensive diffusion of Gulf vapor in a northerly direction, greatly mitigating the winds in the United States. Others attribute these effects to a change in the condition of the sun, which during the last year is said to have been in a state of repose that is very rare, there being no spots or eruptions visible upon its surface. The latter theorists maintain that when the sun spots are at the greatest height, or at their maximum, the earth receives the greatest quantity of heat, and that when the spots are at the lowest, or their minimum, the heat is proportionately lessened, and they claim that these changes, which are known to occur regularly within certain periods, correspond with the great changes of temperature on the earth; the sun's activity with the warm and dry years, and the periods of repose with the cold and rainy years. Others, however, dispute this altogether, declaring that the observations that have been made of the maximum periods of the spots on the sun's surface do not coincide over any length of time, with the warm and cold years, and do not, therefore, justify any such inference.

Monsieur de Perville, on the other hand, maintains, as the result of long observations of dry and rainy seasons in Europe, that they correspond with known changes of the moon. In connection with which I may mention, as a curious fact, derived from recent Assyrian researches, that the Babylonians and Chaldeans attributed changes in the weather to the influence of the moon, and kept up a system of regular observations of the moon for practical purposes.

WANT OF MOISTURE AND FAMINES FROM DESTRUCTION OF FORESTS.

The extreme dryness and consequent want of moisture for the fertilization of the fields in parts of India and China, hitherto fruitful and thickly populated, is attributed to the wanton destruction of the forests on the hillsides. In 1879 Mr. Hilliard visited the famine-stricken province of Shang-Si, in China, and after giving heart-rending details of the terrible effects of the famine—details too painful to state—found in these famine districts that the trees had been extensively destroyed, and attributes the want of moisture and the consequent infertility of the soil to this cause. In the northwest provinces of India an enormous quantity of wood was cut from the hillsides and mountains for the construction of railroads, in consequence of which the soil has been torn from the mountain sides by torrents and precipitated in the valleys below, bringing ruin and destruction upon what was formerly well cultivated fields. The same results have been observed in the Caucasus, where the extensive cutting down of the timber around Tiflis has had the effect of drying up the earth and diminishing the volume of water necessary for the fertilization of the valleys; where also famine is apprehended. A large portion of Persia has suffered in the same way from like causes over a long period of years, a part of Persia which must have been exceedingly fruitful from the accounts given of it by ancient writers.

Observations made in France by Mr. Mathieu and by Mr. Fautral over a period of four years, by different methods, as to the effect under trees and the effect in treeless plains led to the same general results, which are as follows: That it rains more abundantly over forests than over open ground, especially when the trees are in leaf; that the air above the forest is more saturated with moisture than over

the open ground; that the leaves of trees intercept one-third and, in some trees, half of the rainfall, and that the leaves and branches restrain the evaporation of the water which reaches the ground, moistening the earth four times as much as it is moistened by the rain that falls upon open plains. I have been thus particular in enumerating the terrible effects that have recently taken place in China and in India, because I have frequently heretofore in my addresses referred to the excessive and wanton destruction of forests and of the trees upon hill-sides in this country, and to the inevitable consequences which will ultimately follow from it—a destruction which is still wantonly going on, showing an ignorance on the part of our people and governments as gross as that which has produced such calamitous effects in China, India and Persia. A large portion of Northern Africa, now a sandy desert, was once a fertile country, and well populated, as we know from ruins and tombs that are still standing in what is now a vast desert of sand—an effect brought about by the wholesale destruction of trees and the neglect to replace them by replanting. Numerous instances might also be referred to of like effects in certain parts of Europe, where now, however, rigorous laws are enforced for the preservation of forests by compelling the replanting of trees to repair the consequences of cutting them down for timber, and also to other parts of the world, where upon what was once extensive fertile tracts nothing now remains but sandy desolation. Prosperous, fertile and wonderfully productive as our own country now is, if this wholesale destruction of trees is permitted to go on, without any measures to compel replanting, the like results will follow here, and in some parts will be more rapid than in others. Our national government is now directing enquiry to this subject, but our state governments, so far as I know, have done nothing; and yet it is by them chiefly that proper laws should be enacted and enforced to prevent what may ultimately prove a great national calamity.

ETHNOLOGICAL.

DISCOVERY OF A LOST CITY.

Geographical enquiries are not limited to the discovery of unknown countries or places, but embrace the discovery of the remains of lost civilizations or cities, one of which has been discovered during the last two years. The readers of the Bible will remember the frequent mention that is made of the Hittites, a people occupying Canaan, who are described in the biblical narrative as being commercial and military, and in whose country Abraham bought a piece of land for his burial place. The scattered accounts in the Bible simply indicate an ordinary tribe of people, with whom the Israelites had intercourse, but information derived from the researches made in Egypt and Assyria show that the Hittites, whom the Egyptians called the Kheta, and the Assyrians the Khatti, were a powerful confederacy occupying the country which was the highway between Babylonia or Assyria and Egypt; a people actively engaged in commerce, their principal city being a place to which merchants from all parts congregated, and who were at the same time a warlike people, who for a long period kept the Assyrians in check, and who proved the most formidable antagonists the Egyptians ever encountered. They were not only commercial and warlike, but had evidently at a remote period made great advances in civilization and in the fine arts, and early Greek art, as found in the discoveries of Dr. Schlieman at Mycenæ, and the early art found in Cyprus by our associate Gen. Di Cesnola, is supposed to have been largely derived from them.

They occupied the whole country of Southern Syria, from the Mediterranean to the desert, dwelling chiefly in the fertile valleys of the Orontes, a river rising to the east of Balbec and flowing into the Mediterranean, and had two principal cities—Kadesh, or the holy city, and a great

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commercial emporium, which was their capital and the centre of their power, called Carchemish. They were finally overthrown by the Assyrians B. C. 718, and had so completely disappeared that they are scarcely even referred to by Greek writers. Great interest was felt to discover the site of their commercial capital, Carchemish, and many conjectures have been made, none of which, however, could be verified. A few years ago Mr. Skene, the British consul at Aleppo, discovered a huge mound of earth, covering a large area, on the western shore of the lower Euphrates, near Déjrabis, a ford of that river on the route still traversed by caravans. This great mound was surrounded by ruined walls and broken towers, whilst the mound itself was but a mass of earth, fragments of masonry and debris. It had frequently been seen by previous travelers, but they identified it with other lost places. Mr. Skene called the attention to it of the late George Smith, the eminent archæologist, who brought so much to light from the ruins of Nineveh, and Mr. Smith found here the long-lost capital of the Hittites. The present British consul, Mr. Henderson, has been during the last two years engaged in the exploration of the mound. He has already sent important remains with inscriptions to the British Museum, and an English traveler, Mr. Sackaw, has been recently engaged in investigating it. A few years ago a stone, which had formed part of the wall of a house at Hameth, had an inscription upon it which excited great curiosity, because it was neither Assyrian nor Egyptian, but something between both languages. It may be remembered that I called attention in one of my former addresses to the discovery of this stone and one or two others, containing like characters, which were then called the Hamite inscriptions, with the suggestion that this might probably be the language of the Hittites, which is now proved to be the fact. The inscriptions found by Mr. Henderson in the exploration of Carchemish are not

only in the same character, but the same language, which Mr. Layard found impressed upon seals discovered by him in the ruins of the record chamber of Senacherib's palace, which greatly excited his curiosity, as the writing was unlike any ever noticed before. Another inscription was afterwards discovered at Aleppo by Mr. Davis, a missionary; and it also turns out that the famous figures sculptured above the roads from Ephesus to Phocea, and from Smyrna to Sardis, which are mentioned by Herodotus, and were supposed by him to represent the Egyptian King Rameses the Second, the Sesostris of the Greeks, have inscriptions upon them in the same character as that recently found in Carchemish, showing that these figures also are Hittite monuments. It is supposed that this language was the source of what is known as the Cypriote syllabery, found in Cyprus, a system of characters each of which do not, like the letters of the alphabet, represent a single sound, but a syllable, which was probably the language in use among commercial people throughout Asia Minor, until it was superseded by the simpler and more practical Phœnician alphabet, and that a connection existed between these two languages is probable as the Hittites belonged to the same race of people who perfected by the alphabet, that greatest of human inventions, a written language. We have in this discovery of Mr. Smith the memorials of a lost people, in neighboring proximity to the Phœnicians; a people who had an important part in the early progress of ancient civilization, with respect to which an eminent Egyptian scholar expresses his conviction that future discoveries in the course of this exploration will afford convincing proofs that this civilization, which was of the highest antiquity, was of an importance which we can now only guess at.

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RESULTS OF THE DISCOVERIES AT NINEVEH.

What may be anticipated when scholars are able to read these inscriptions, as in all probability they will be, for the cuneiform or arrow-headed characters of Assyria have been read, is foreshadowed by what has been brought to light by the discoveries of Layard and Smith in the mound which now represents what was once Nineveh. Beneath a mass of rubbish was found the remains of what had been a great Assyrian library, the materials of which being of baked clay had proved indestructible, and though lying in broken fragments, Mr. G. Smith was able to piece the fragments together, and recover over three thousand inscriptions, forming pages of the volumes of which the library was composed, and in some cases recovering entire books. The tablets or leaves of these volumes or bricks, as they are called, are formed of thin plates of clay, upon either side of which the text was inscribed when the clay was soft, the tablet being afterwards baked or dried, when the bricks or leaves, like our modern books, were arranged in chapters and volumes. Nearly two-thirds of this library is now in the British Museum, which, through the politeness of Mr. R. H. Major, I had the pleasure of inspecting in 1874. It embraces treatises on history, astronomy, geography, religion, morality, astrology, and other subjects. From one of these books, compiled after the manner of our modern encyclopædias, and the compilation of which is shown to have been made more than 2,000 B. C., it has been ascertained, what has long been supposed, that Chaldea was the parent land of astronomy; for it is found, from this compilation and from other bricks, that the Babylonians catalogued the stars, and distinguished and named the constellations; that they arranged the twelve constellations that form our present zodiac to show the course of the sun's path in the heavens; divided time into weeks, months and years; that they divided the week, as we now

have it, into seven days, six being days of labor and the seventh a day of rest, to which they gave a name from which we have derived our word "sabbath," and which day, as a day of rest from all labor of every kind, they observed as rigorously as the Jew or the Puritan. The motion of the heavenly bodies and the phenomena of the weather were noted down, and a connection, as I have before stated, detected, as M. de Perville claims to have discovered, between the weather and the changes of the moon. They invented the sun-dial to mark the movements of the heavenly bodies, the water-clock to measure time, and they speak in this work of the spots on the sun, a fact they could only have known by the aid of telescopes, which it is supposed they possessed, from observations that they have noted down of the rising of Venus and the fact that Layard found a crystal lens in the ruins of Nineveh. These "bricks" contain an account of the deluge, substantially the same as the narrative in the Bible, except that the names are different. They disclose that houses and land were then sold, leased and mortgaged, that money was loaned at interest, and that the market gardeners, to use an American phrase, "worked on shares"; that the farmer, when plowing with his oxen, beguiled his labor with short and homely songs, two of which have been found; and to connect this very remote civilization with the usages of to-day, I may, in conclusion, refer to one of the bricks of this library, in the form of a notice, which is to the effect that visitors are requested to give to the librarian the number of the book they wish to consult, and that it will be brought to them; at the perusal of which one is disposed to fall back upon the exclamation of Solomon, that there is nothing new under the sun.

A writer in the *London Times* has said, in respect to these discoveries, that they have opened up to us an extinct civilization, that existed before Rome or Athens was

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founded, of which nearly every trace and memorial had been lost until these discoveries were made a few years ago; that a new and earlier page in the history of mankind —in that of religion, science, and the arts—has been opened by the discovery of the remains of this library, which Abraham may have consulted in what was the land of his nativity.

CHINESE INSCRIPTIONS FOUND AT HISSARLIK.

A very curious fact has come to light, resulting from Dr. Schlieman's discoveries in the Troad. In the lowest strata of his excavations at Hissarlik he found a vase with an inscription in an unknown language. Six years ago, the eminent orientalist, E. Burnouf, declared the inscription to be in Chinese characters, for which he was generally laughed at at the time, from the improbability of Dr. Schlieman finding, in the lowest strata of his excavations, a vase with an inscription in the Chinese language. Now, however, it appears that the Chinese Ambassador at Berlin, Li Fangpau, who in his own country is a distinguished scholar, has read and translated the inscription, which, he says states that three pieces of linen gauze are packed in the vase for inspection, being what we, in our day, would call sending a sample of merchandise into a foreign country to create a demand for it. E. Burnouf previously declared that the inscription was to the effect that the vase contained pieces of goods (*pieces d'étoffe*). The Chinese Ambassador fixes the date of the inscription as about 1200 B. C., and further states that the unknown characters so frequently occurring on the antiquities found by Dr. Schlieman, especially on the terra cotta, are also in the Chinese language, which would show that, at this remote period, commercial intercourse existed between China and the eastern shores of Asia Minor and Greece.

DISCOVERIES OF PREHISTORIC REMAINS IN EUROPE.

Discoveries are constantly being made in different parts of Europe of prehistoric remains, chiefly consisting of implements, utensils, &c.; and some further discoveries have been made of lacustrian dwellings lying below the waters of lakes. Explorations were made along the shores of Lake Garda, in Italy, and a large number of prehistoric relics were found. Discoveries of this character, or, as they are usually called, "lacustrian finds," have during the last year been unusually rich in Switzerland; many of the lakes being cut off from much of their accustomed supply of water, and reduced to an extremely low level. Many new things have been brought to light, especially in the lakes of Neufchatel and Morat. The discoveries have been of a very interesting kind, and have led archæologists to revise some of their former opinions, and assign to the lake dwellers of Switzerland a higher degree of civilization than they had been previously supposed to possess. The most remarkable find, both as respects the variety and the number of things discovered, was in a turf moor of peat moss near Seeberg, in the Canton of Berne. The indications are, that the ancient inhabitants who lived in the vicinity of this moor made their own tools and arms from materials brought from other places, and probably as far as what is now France, no flint being found in the neighborhood. Stones were found, splintered by the action of heat, which was supposed to have been used for the purpose of boiling water, as the lake dwellers had no vessels capable of standing fire. The pottery found was very primitive. It was made entirely by hand, and baked before an open fire. Some of the vessels were found with the remains of the food still adhering to them, and the design of the vessels, though rude, showed that those who made them were not without the artistic instinct. The discoveries proved

that these people were basket-makers, and not unskilled in carpentry; one of the articles having a bent basket handle exactly like those at present in use, and the hatchet handles were found to be exceedingly well made. One wooden instrument bore a striking likeness to the stock of a pistol, and probably served as the haft of some bone tool or weapon for boring or thrusting. Bone chisels were very numerous, and arrow-heads of the same material were found. The metatarsal bone of a stag was found, which had been fashioned to serve as a fork, and was evidently intended to be used for the purpose of eating. Forks have heretofore been supposed to be of comparatively modern invention, but this discovery indicates that the one of elegancies of life was appreciated at that remote period by the primitive inhabitants of this place. The remains of animals were very interesting—among them being the bones of the dog, the badger, the wild ox and the bear. The interesting fact was also ascertained that they were keepers of cattle, for the most numerous animal remains discovered were those of the common cow. There was evidence also that the pig had been domesticated; but no remains of the horse were discovered, showing that that animal was unknown to the inhabitants.

Mr. W. I. Knowles has found flint instruments in the valley of the river Bann, in the north of Ireland, underlying a formation of peat, the age of which is computed to be about seven thousand years. Mr. S. B. J. Sketchly has found palaeolithic implements in deposits of chalk and boulder clay, indicating, from the position in which the implements were found, that man existed in East Anglia previous to the glacial period; and M. Europeas, who has been for some time engaged in researches among the Finnish population of Northwestern Russia, has come to the conclusion that, in the first centuries of the Christian era, the whole of Northeastern Europe, as well as the Scandinavian peninsula, was

peopled by tribes of Finnish-Hungarian and Finnish-Aryan origin, and that they then formed an extensive and powerful people.

ANCIENT EGYPTIAN RIVERS.

Dr. de la Motte, who is thoroughly acquainted with the geography and geology of Egypt, declares that the Nile was not the only river that watered prehistoric Egypt, but that the country was then watered by many rivers that are now dried up, and which the Arabs of to-day call, in the great beds of sand, *the rivers without water*, as shells and aquatic remains are found in them, indicating that they were once rivers. He does not, however, assume to indicate when, or what were the causes which led to this drying up, and changing into a desert what was once fertile regions. He is also of opinion that the whole plateau of Khartoum was formerly a great lake, like Lake Ukerewe (Victoria Nyanza), from which the Nile then issued.

AMERICAN PREHISTORIC REMAINS.

M. L. de Hessac has made an immense collection of Indian implements during two years of exploration on the coast of California, and Mr. I. M. McNiel has been engaged for several years in the exploration of graves in various parts of the Isthmus of Panama, the graves forming part of a vast cemetery of many miles in extent, in the vicinity of Mount Chiriqui, containing the remains of vanished races of whom nothing is known. The remains are chiefly pottery, generally of unglazed clay, made by hand by a people unacquainted with the potter's wheel, and small articles such as whistles and rattles, which appear to have been children's toys; the whole resembling articles that have been found in Etruria.

ANTIQUITY OF MAN.

There have been other discoveries throwing light upon the question of the antiquity of man, which, as they are of a like character, it is scarcely necessary to detail. It may be interesting, however, to give the latest conclusions upon this subject of Dr. E. B. Tyler, President of the Anthropological Institute of England, and one of the most eminent in this field of enquiry. He states, as the result of the evidence so far obtained, that the causes which brought about the differences in the form of the skull, the color of the hair and skin, and the physical constitution of men, had chiefly accomplished their work long anterior to the dawn of history; since when, he says, some changes may be traced, brought about by migrations or the effects of climate. He declares that the ground taken by Principal Dawson, of Montreal, the eminent geologist, fixing the period of development at about twenty-two hundred years B. C., is bringing it within the historic period, and that it has nothing, as shown by the Egyptian and Assyrian researches, to support it. Mr. Tyler states that the evidence now accumulated strengthens the probability that all men are descended from one original stock, which, he thinks, is inferable from the close resemblance of all human beings in body and mind, and from the freedom with which races intercross and produce mixed races. He thinks that the period anterior to history was one of vast length. He says, when we trace back early languages, such as the Aryan and the Shemitic, we do not find the parent tongue of any one of them, and that the attempt to reconstruct from them an earlier language brings us no nearer to the primitive form of speech, and that the whole structure of language is such that it can be accounted for only by the presumption of a long past. That history shows that the growth of every civilization was gradual, every age exhibiting recognizable traces of the ages that preceded it. That the

Egyptian monuments show that five thousand years ago civilization there was greatly advanced, as there was then in Egypt an elaborate system of government, a highly educated and literary priesthood, a nation skilled in agriculture, architecture, and in the arts, and especially in the working of metals, including iron; and that the Egyptians of this early period, so far from being near the beginning of civilization, had already advanced half-way. That it is shown by their monuments that the present native race of Egypt, the Fellahs, are little changed in feature and color from their ancestors as they appear on the early monuments, and that they are in fact the same people. He states that anthropologists now consider the Egyptians as belonging to an African rather than to an Asiatic race, as has been previously supposed; that they are in many respects different from the Shemitic races of Asia, but that a deep Shemitic element exists in the Egyptian language, showing that there was a very ancient and a very intimate connection. The reasonable conclusion, he thinks, is that they were a mixed race, but mainly of African origin, and that they came originally from the Southern Somali Land, which, according to Egyptian tradition, was the place from whence their Gods were derived. His further conclusion is that the Chaldeans and Babylonians, as indicated by their early languages, the Accadian and Medic, were of a Tartar or Touranian family, and may possibly have belonged to the yellow races of China, whilst the Assyrians were of the white race, and he thinks that the conclusion of many naturalists is correct that the geographical centre from which man emanated and spread over the globe was in the tropical regions of the old world.

Dr. R. Fahn, on the contrary, who has been making extensive linguistic researches in South America, comes to a totally different conclusion from Mr. Tyler. The doctor, in a communication recently published in Vienna, claims as the

result of his researches that America is the old world, and Europe, Africa and Asia the new. He declares that the languages spoken by the Indians in Peru and Bolivia exhibit astounding affinities with the Shemitic languages, and especially with Arabic, with which the doctor is thoroughly acquainted from boyhood. He claims that the Shemitic roots are universally Aryan, and that the stems of all the varieties of the early Aryan tongues are found in their purest condition in the languages of the Indians of Peru and Bolivia, especially in the Quichua and the Aimara; and he maintains that the high plains of Bolivia and Peru are the central point from which the human race dispersed; which accords with the view expressed by some American archæologists that America is not only geologically but ethnologically the old world.

Prof. Mudge has gone into a calculation of the number of years to which the existence of man upon the globe may be traced. As the bones of man have been found at the close of the glacial epoch, Prof. Mudge founds his computation upon the probable duration of three epochs that followed each other, which are known to American geologists as the Champlain, the Terrace and the Delta periods; all of which, he says, are supposed to have been of equal length. He undertakes to compute the possible length of the last or Delta period, which he computes from the rate at which the delta of the Mississippi is deposited over a distance of about three hundred miles, and of the probable periods of the growths of ten buried forests, which, in that region, lie over each other with interspaces of sand, indicating that they must have succeeded one another; some of the trees of which are twenty-five feet in diameter, and one of which contains five thousand seven hundred annual rings. Without going into the details of his computation, I will simply give the result at which he arrives, which is that those three periods—the Cham-

plain, the Terrace and the Delta—embrace a length of at least two hundred thousand years, during which, according to this computation, man has existed upon the earth. In respect to this conclusion, I have only to observe that all computations of this kind, as Lyell has shown in respect to the deposits of the Nile, are very uncertain data upon which to found any exact computation as to time; though they may indicate, all the conditions being well ascertained, that considerable spaces of time must have elapsed between successive periods. Professor Mudge says that the evidence which he produces would be received as proof of the facts in any court of justice; in respect to which I would say to the learned professor, having had much to do in my life in testing the uncertainty of evidence, that this belongs to a class where a great deal must be assumed in the present state of our knowledge, and that it is a kind of evidence upon which no conclusion can be based, except of a very loose and general kind. The best proof of this is the wide diversity of opinion that exists among geologists as to the length of time that elapsed in the formation of particular deposits or strata.

ARCTIC.

The Arctic events of the period under review have been as follows: In the summer of 1878 Captain Moria, of the Danish war steamer *Ingulf*, sighted the farthest land reached on the east coast of Greeland by Scoresby in 1821, but was unable from the obstruction of the ice to get any further north. Captain Burryene in the same year, in the *Barentz*, of the Dutch Arctic expedition, sighted Franz Josef Land, reaching 78° 18′ N. lat., being the first sailing vessel that has reached so far north. Captain E. Johannessen penetrated a considerable distance east of Nova Zembla in 77° 35′ N. lat. and 66° E. long., discovering an

island ten miles long north of the Yenessei, in 77° 55′ N. lat., level and free from snow, with a poor vegetation, but containing an immense quantity of birds. From the types of animal life in the water, there was evidence that the Gulf Stream touched the west coast of this island, which lies a little to the southeast of Franz Josef Land, and may be a part of that archipelago. Captain A. H. Markham, R.N., and Sir Henry Gore Booth, in the Norwegian cutter *Isjorn*, succeeded in rounding Cape Nassau, reaching as far as Cape Mauritius, the extreme northeast point of Nova Zembla, and from there reached as far as 78° 24′ N. lat., being within eighty miles of Franz Joseph Land. In these several expeditions useful geographical work was done in the observation of currents, movements of the ice, dredging, examining the temperature of the water, and valuable collections were made in natural history.

MR. JAMES GORDON BENNETT'S EXPEDITION.

An important event has been the dispatch of the steamer *Jeanette* by the way of Behring's Straits, with a view of exploring Wrangell's Land, and of penetrating, if possible, as far as the Pole. This expedition is due to the munificent liberality of our associate, Mr. James Gordon Bennett, and it is gratifying to be able to state that when the *Jeanette* was last heard from the indications were favorable as to the result of the expedition. In the early part of last September she was seen by Captain W. M. Barnes, of the whaler *Sea Breeze*, in the vicinity of Herald Island, and probably reached Wrangell's Land, as it appears from the statement of Captain Kelly, of the whaler *Dawn*, who saw the smoke of the *Jeanette*, that the ice gave way and disappeared in a remarkable manner in October, so that, on the 7th of that month, he saw Wrangell's Land at a distance of about twenty-five miles, without any ice between his vessel and that Land. The coast-line of Wrangell's Land, as he

saw it, showed very little snow, but the mountains in the interior were covered with it, and it was his impression that the *Jeanette* would undoubtedly reach there. When he last saw the *Jeanette*, on September 3d, she was tacking east and west, directly south of Herald Island, making her way a little to the east, and from the point where he last saw her she could, he says, have reached Wrangle's Land in twelve hours, with open water.

NORDENSKJOLD'S EXPEDITION.

The greatest event in the Arctic, during the period under examination, was the accomplishing of the northwest passage around Asia, by Professor Nordenskjöld. The object of this expedition was not only to accomplish what had been attempted so many times without success, from the first expedition of Willoughby, in 1553, but also the acquisition of important scientific information, it being now the opinion of meteorologists that the climate of Europe and America is materially affected by the ever-changing ice and other physical conditions of the Siberian seas, and that we will never get a thorough understanding of the laws which regulate the movements of the winds and the great currents of the sea until we obtain a more thorough knowledge of the state of things in the polar basin.

The conclusion arrived at at the Polar Congress, recently held at Hamburg, was that the information to be obtained in that region is of the greatest practical importance, and that nothing will satisfy the present requirements of science but the ultimate establishment of fixed points of observation around the Polar basin as near to the Pole as possible; and this opinion is not confined to meteorologists, but has been expressed by eminent men in various departments of the physical sciences.

The success of Professor Nordenskjöld in achieving this

long-sought passage was due to the fact that he is himself an eminent scientific man; that he had a large experience previously in Polar exploration, and that before undertaking this expedition he carefully studied everything that had been done, from the first attempt, in the reign of Elizabeth, down to the last expedition. Not only was he possessed of all the historical and scientific information of the past, but the expedition was conceived, planned and carried out upon the most rigid scientific method. So far as the dimensions of the vessel would allow, she was thoroughly equipped with scientific apparatus of various kinds, and with an efficient corps of scientific men to assist the distinguished leader in the acquisition of all the information that could be obtained. The vessel left Gothenberg on July 4, 1878, for Tromsoe, in Norway, where the final outfit of furs and other things necessary in Arctic regions were obtained. Here she was joined by the companion vessel, *The Lena*, and on July 25th both vessels sailed and passed through the Yugor Straits, south of Nova Zembla, on August 5th, without any obstruction from ice between Weigatz and the continent. The Kara Sea was found equally free from ice, and both vessels sailed without any obstruction to Port Dickson, a little east of the mouth of the Yenissei, which they reached on August 6th. Here both vessels sailed for Cape Taimyr, where their progress was first arrested by the ice, and where they were compelled to remain for several days in a fine harbor between Taimyr Island and the mainland. The country was found covered with mosses and lichens, and although offering better pasturage for reindeer than the valleys of Spitzbergen, where reindeer abound, the animal was scarce and very shy, which was attributed to the presence of wolves. On the 19th of August they weighed anchor, sailing along the peninsula, and reached Cape Chelyuskin, the northernmost point of Asia, which was discovered in a land-sledge

journey, in 1742, by a Russian lieutenant, whose name it bears. They doubled the Cape, ran into a creek or little bay on the eastern side of it, and having now achieved what had been attempted in vain for more than three centuries, they ran up the flags and fired a salute, whilst a large polar bear, the only inhabitant, stood looking at them from the shore. When the mist cleared away, Cape Chelyuskin lay before them free from snow. They landed and remained sufficiently long to fix the position of the cape astronomically, which, on the western of its two promontories, was found to be 77° 36′ 37″ N. lat., and 103° 25′ W. long.

The plains were of a clay formation, and some of them were nearly bare, while others were clothed with vegetation, consisting of grass, moss or lichens. The strata of the rocks were upright, devoid of fossils, and on the outer promontory there was a strata of slate crossed by large veins of quartz. Animal life was scarce; a few birds were seen, a large flock of barnacle geese, a few eider ducks, and traces of owls. Vegetable life was equally meagre. In the sea about them they saw walrus, a few seals, two shoals of white whales, and the dredge brought up large algea and a number of minute animals. On the 20th of August they sailed from Cape Chelyuskin in a southeast direction, in the expectation of discovering a western continuation of the group of islands known as the Liakoff Islands or New Siberia, but a dense fog and the pressure of drift ice prevented them making any further progress due east, and they were compelled to take a more southerly course, the breeze carrying the vessel swiftly over a smooth sea. The mountains along the coast, which were from two to three thousand feet in height, were free from snow, and in the water animal life was abundant, with a rich variety of creatures, indigenous to the Arctic seas.

They were now sailing over an area which is marked on

the maps as land, and on the 24th of August they reached Preobraschensky, in the mouth of the Gulf of Chatanga, which was found 4° east of its position on the maps. From here, as the darkness came early, they had to proceed with great care, as the coast line on the map was not to be relied upon, and the sea was shallow, but they had the advantage of magnificent weather and a sea free from ice, which was attributed to the mass of warm water poured into it during the summer from the great Siberian rivers. Constant observations made as to the temperature and saltness of the water at different depths showed that a warm surface current runs from the mouths of the Obi and the Yennessei in a northeast direction, and afterwards is bent by the rotation of the earth more to the east. The warm waters discharged by the various rivers from the Chatanga to the Kolyma renders this sea for a short period of the year almost free from ice along the coast, confirming the impression that Nordenskjöld had formed, which led him to believe that a passage could be effected by water. The original plan of the voyage was to have anchored at the mouth of the Lena, but there being a favorable wind and the sea free from ice, he continued eastward with the *Vega*, and parted company with the *Lena*, his companion vessel, which went up the river to Yakutz. Nordenskjöld wished to land on Liakoff Island, the most southerly of the New Siberian group, to collect mammoth and other fossil remains, and the vessel's course was set for that island's western shore, but this he was unable to do from the obstruction caused by the great fields of ice that skirt the shores of this group. He therefore continued on to the mouth of the Kolmya river, which was found open, and continued to press eastward to Wrangell's Land, which has always been an object to explore from the statement made heretofore by the natives of Cape Yakan that they had seen people in the winter, unknown to

them, coming over the ice in that direction from the north-east and returning the same way; but Nordenskjöld found his way towards the northeast barred by drift ice, and had to change his course to the west, reaching Cape Baranoff, from whence he kept along the coast, and on the 6th of September sighted Cape Shelagskoi, to the east of which point they first saw natives, who came rowing towards them in two sealskin boats, but from whom they could get no information, as they spoke no language but Tchuktchis; and after this they passed one or more native villages, receiving visits from the natives, who were kindly. They rounded Cape Shelagskoi, and on the 12th of September arrived at North Cape, where they were detained by the ice six days. Here, in a shallow bay, was a Tchuktchi village, the chief of which visited them, and is described as a particularly attractive man. He and his wife were taken into the saloon of the *Vega*, where they were astonished at what they saw. He showed great delight at a performance on the barrel organ, commencing at first to quiver at every limb, but soon dancing most vigorously, and he spent hours contemplating his brown yellow face in a mirror.

They succeeded in getting about fifty miles further, but at last, on the 28th of September, the vessel was imprisoned in the ice, near a Tchuktchi settlement, in 67° 7″ N. lat., 173° 30′ W. long., where they remained for two hundred and sixty-four days.

The point where the vessel lay is off Cape Serdze, about one hundred and twenty miles from the Pacific termination of Behring's Straits. The sea in this part of the Arctic is generally open, vessels engaged in sealing and whaling north of Behring's Strait sailing thereabout in every direction; but, unfortunately for the explorers, this appears to have been an exceptional year. The chief difficulty they had anticipated was in passing Cape Chelyuskin, whereas their real obstacle was found off a part of the coast where it was

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least suspected. The natives, the Tchuktche, are comparatively new occupants of the country, who at some former period drove away a more civilized race. They resemble the Esquimaux and the Mongolians, but they did not understand Russian, nor any other of the languages known to the explorers. They are a people of small stature, although some are tall, one woman they saw being six feet three inches in height. They have black hair, black eyes, brown-yellowish complexion; are clothed in reindeer skins; live chiefly by fishing; use stone and bone implements, and they traverse with their sledges great distances, one of them departing whilst the explorers were there on a journey with his sledge to the mouth of the Kolyma, seven hundred miles away.

The natives, men, women and children, came constantly to the vessel during the time that the *Vega* remained there, and were allowed to roam freely over the deck, which was crowded with articles, and yet nothing was ever missed. The ship was also visited by Menka, the chief of the reindeer Tchuktches, by whom the letters were sent which ultimately reached Europe. A little incident is worth mentioning, as showing what the savage as well as the civilized man will do in the matter of self-importance. After the chief went on shore, he assembled the natives around him, when he unfolded the letters, and holding them upside down, read apparently from them long sentences in the Tchuktch language, to an audience devoutly impressed with his great learning.

On the 18th of July, 1879, the vessel was released, and on the 2d of September following reached Yokohama, in Japan. The coast from the River Lena to Behring's Straits was found to be correctly placed on the charts; but the previous coast line from the Yennissei to the Lena was so badly laid down that the *Vega* and her companion vessel sailed for nearly three hundred miles over what on the latest charts is represented as land.

My limits will not admit of my giving further details. I can only mention the conclusions to which Nordenskjöld has arrived from the results of the expedition, which are, that the voyage from the Atlantic to the Pacific around the north coast of Asia may be made by a suitable steamer in a few weeks at the proper season, but that the route is not likely to be of any practical commercial importance; that there is no difficulty in establishing a regular communication by water between the rivers Obi and the Yenessei and Europe for the purpose of trade; that in all probability the voyage by sea between the Yenessei and Lena, and between the Lena and Europe, may be utilized for the purposes of commerce; that the voyage there and therefrom may be made in the same summer; and that further explorations are necessary to determine whether a practicable communication by water can be established from the River Lena to the Pacific.

THE SIR JOHN FRANKLIN SEARCH EXPEDITION.

The *Eöthen* landed near Depot island, in the north of Hudson's Bay, on the 9th of August, 1878, Lieutenant Schwatka, Colonel H. Gilder, Esquimaux Joe and the other members of the expedition for the discovery of some remains of Sir John Franklin's expedition, supposed to include the journals, reported by two Netchelli Esquimaux to exist on an island in the Gulf of Boothia. The expedition found upon their arrival that the principal Netchelli who gave this information to Captain Barry and offered to go with him to the island was dead, and the other, who had left the Netchelli when he was young, knew only of the Franklin expedition by hearsay. In the fall of 1878 Lieutenant Schwatka surveyed the coast from Baker's Foreland to Cape Fullerton, which is erroneously laid down on the present charts, having a totally different curvature, with two rivers flowing into it and a bay at the north. In the spring they made a sledge journey to King William's

Land by way of a river, to which they gave the name of Connery river, after the assistant editor of the *New York Herald.* Another river running northwest for an estimated distance of about ninety-five to one hundred miles was discovered by Colonel Gilder in a land journey on the following August, and named by him Lorillard river. A large lake was also discovered about fifty miles long, and named Brevoort lake, after our associate and councilor, J. Carson Brevoort, Esq. This is the substance of the information of a letter received by me from Lieutenant Schwatka, accompanied by drawings of their encampment and surrounding country and a map of the coast surveyed.

WINTERING IN NOVA ZEMBLA.

A Russian settlement was established in August, 1878, in the harbor of Karmakul, in Nova Zembla, for the relief of shipwrecked mariners and for meteorological observations, which consisted of a colony of Samoyedes, under M. Tjagin. M. Tjagin remained with the colony until the summer of 1879, when he returned to Archangel. Moller Bay did not freeze during the whole winter except among the islands along the coasts. M. Tjagin states that wintering in Nova Zembla is quite practicable, especially for Samoyedes, and that this refuge station or settlement can undoubtedly be maintained.

BRITISH AMERICA.

The survey of the northern boundary line between the United States and the possessions of Great Britain, which I described in my annual address in 1877, has been completed. This survey extended from the farthest northern point of the Lake of the Woods to the summit of the Rocky Mountains; the line from the Atlantic to the northwest angle of the Lake of the Woods and from the summit of the Rocky Mountains to the Georgia Strait having been

previously surveyed and adjusted between the two governments. The survey of the intermediate or connecting line between the Lake of the Woods and the summit of the Rocky Mountains has been carried on since 1872 by Mr. Archibald Campbell, on the part of the United States, and by Major William J. Twining, U.S.E., as chief astronomer; and the completion of the line has been fixed by forty astronomical stations, three hundred and eighty-eight monuments, and by thirty-four maps on a scale of an inch to every two miles.

UNITED STATES.

The geographical work in the United States of the Coast Survey, of the Navy Department and of the United States Corps of Engineers has been continued as in previous years. The engineer corps, which is chiefly devoted to valuable work in the improvement of harbors and rivers, embrace details too numerous to refer to in an address like this, which is also the case with much of the detailed work of the coast survey. One part of it, however, may be particularly mentioned.

PROFESSOR A. AGASSIZ' DREDGING IN THE CARIBBEAN SEA.

Professor A. Agassiz was engaged in 1878 and 1879, in the United States steamer *Blake*, in dredging and taking soundings in the Caribbean Sea, along the islands of Cuba, Jamaica, St. Domingo, Porto Rico, the Windward Islands, the Leeward Islands, and the islands between Costa Rica and Jamaica. His report of the result is of interest not only to naturalists, but to geographers, as showing the changes that have taken place in the form and distribution of lands along these various groups of islands and in the form of the land beneath the waters. Jamaica was found to be only the northern spit of a gigantic promontory which once

extended towards Hayti from the mainland, reaching from Costa Rica to the northern part of the Mosquito coast. The affinity of the fauna of Cuba, the Bahamas, Hayti and Porto Rico, notwithstanding the near proximity of these islands to Florida, was found not to be with the southern part of the United States, but with Mexico, Honduras and Central America. At a depth of 500 fathoms a gigantic spit, extending northerly, unites all the islands from the mouth of the Orinoco, south of Martinique. The investigation showed that at a former period Central America and northern South America must have been a series of large islands, and the Caribbean Sea either a gulf of the Pacific or connected with it through inside passages. Professor Agassiz was able from the soundings to trace the outlines of a former extension of the South American continent with tolerable accuracy, and the examination, he states, shows that it is incredible, with the huge mass of waters pouring into the Gulf of Mexico, that there should be a cold current forcing its way up hill into the Straits of Florida, as has been heretofore theoretically assumed.

GEOGRAPHICAL WORK OF THE U. S. NAVY DEPARTMENT.

The survey of the Pacific coast off Guatemala has been carried on by Commander J. W. Philip, U. S. N., in the U. S. Steamer *Tuscarora*, and will be completed next season.

In pursuance of the plan of accurately determining a large number of secondary meridians of longitude by means of the telegraph cables, Lieutenant-Commanders F. M. Green and C. H. Davis, U. S. Navy, have, under the direction of the Bureau of Navigation, extended a chain of measurements from the Greenwich meridian by way of Lisbon, Madeira, the Cape de Verde Islands, Pernambuco, Bahia, Rio de Janeiro, and Montevideo, to Buenos Ayres, connecting there with the measurement made by Dr. Gould across South America to Santiago and Valparaiso. In each case

the latitude has been established by the zenith telescope, and the longitude by telegraphic exchange of time signals. A similar measurement was made from Pernambuco by way of Maranham to Para. This chain of longitudes is the longest ever measured in this way, and the results will be shortly published.

One rather unexpected result, but which has been established beyond doubt, is the demonstration that the city of Lisbon, and, indeed, the whole coast of Portugal, should be laid down on the charts considerably more than two minutes of longitude to the westward of its present place.

GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE WESTERN TERRITORIES.

The extensive and valuable surveys of our Western territories, which was formerly carried on either by the War Department or as distinct and separate surveys, severally known as Hayden's, Powell's or other names of the military officers or civilians conducting them, have been reorganized by an Act of Congress, and under the Department of the Interior are now included in one bureau, which, by the appointment of the President, has been placed in charge of our associate and member of our Council, Clarence King, Esq. Since this change and during the past year the bureau has been chiefly engaged in preparing and publishing the results of the mass of material collected in preceding years, the field events of the last year having been limited to the department of economical geology, the desire for information of this description in the interest of mining being very great. The maps recently issued by the Departments of War and of the Interior may be noted as marking an era in the geographical knowledge of our great Western region, and the information they have afforded for the last six months, judged by its results, is alone worth their whole cost.

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PROFESSOR HAYDEN'S SURVEY.

The geographical events of 1878 may be briefly stated. Mr. W. H. Gannett made a detailed and careful survey of the Yellowstone National Park. The mean elevation was found to be between 7,000 and 8,000 feet, and the whole park was covered with a dense growth of magnificent pines. Grazing land exists only on the northern border and in small patches, no mines or mineral deposits were found, and the temperature is such as not to admit of agriculture, except in certain localities. Mr. Bates Holmes, the geologist of one of the divisions, sketched every square mile of the park in detail. All the geysers, hot springs and mud volcanoes were recorded. The geyser named "Old Faithful," the largest of them, was again examined by Professor Hayden to see if the phenomenon had developed any new features. This geyser, in intervals of an hour, projects a stream of hot water 200 feet into the air. It was found still subject to hourly irruptions, the intervals of irruptions occurring as regularly they state "as the tick of a clock." Other divisions of the survey examined the adjacent country. The party having charge of the primary triangulations covered during the season an area of about eighty thousand square miles, and the height of over one hundred and fifty mountain peaks were determined, the highest ones being from ten thousand to fourteen thousand feet; Fremont Peak and Mount Washington were found to be the two highest.

This expedition had to endure many hardships, and were at times in extreme peril in crossing the swift mountain streams. Wild game abounded, and the men could sit by their camp fires and shoot moose, elk, deer and bears. The grand canon of the Yellowstone was also again explored by Professor Hayden. The gorge is three thousand feet deep, the walls being almost perpendicular, and at the bottom of the chasm it is so dark that the stars

are plainly visible at every hour of the day. The loneliness is described as oppressive. There are numerous waterfalls, the lower fall having a plunge of four hundred feet, and the three next in height of about one hundred feet each.

LIEUTENANT WHEELER'S EXPLORATION IN NEVADA AND OREGON.

Lieutenant Wheeler, in 1878, explored Pyramid Lake, in Nevada, which receives the Tuckea river. The lake, which is about forty miles long, has no visible outlet, is of great depth, is conspicuous for its surroundings of immense columnar rock, and is the least known of the North American lakes. The question stiill remains an unsettled one whether there is a subterranean drainage in this part of Northwestern Nevada, or whether, under the dry climate, the water evaporates in the valley. Lieutenant Wheeler crossed the arid volcanic Oregon desert to the alkaline Lake Albert, where he and his party narrowly escaped an Indian attack. He visited Klamath Lake, which presented the same physical features as Pyramid Lake, and evidently belongs to the great Basin Plateau. Here the party divided, and Lieutenant Wheeler explored the Cascade range, parallel to the Pacific coast, carrying from St. Symonds the triangulation to the north. Mount Pitt, which was found to be four thousand feet above the level of the country, and ten thousand above the sea, was scaled with great difficulty, from the lava, fallen timber, rock slides, &c. From another peak Crater Lake was seen, confined within vertical cliffs two thousand feet high, its area being about fifty miles, and there was evidence of recent volcanic action. The explorers proceeded northward, finding innumerable small lakes, when their further progress on the mountain crest was stopped by dense forests, thousands of acres of which are set on fire by the Indians when they are pursuing game. Desschute's river was also examined. It was found to be a

turbulent stream, percolating through piled-up masses of lava, and one which can never be navigated from its numerous rapids and cascades. Mr. Walker ascended Mount Hood, twelve thousand feet high. He found, far above the snow line, that hot steam issued from the craters on its side, and five hundred feet from the top there was a large basin, the main crater of which gave out sulphurous steam, and other craters and huge glaciers were seen on the southeast side. The result of this exploration is that the capabilities of Oregon west of the Cascade Mountains are very good, and although to the east of that range the rainfall is limited, the land is fertile in the Desschutes basin, and the supply of water for irrigation plentiful.

THE HENRY MOUNTAINS.

The Henry Mountains of South Utah, discovered by Professor Powell ten years ago, have been surveyed by Mr. G. K. Gilbert. The mountains, which are from 11,250 to 7,750 feet high, are not a range and have no trend, but are simply a group of five individual mountains separated from each other by low passes, and are embraced in a radius of eighteen miles. They stand upon an arid, rugged and desolate plain, deeply cut up with cañons, and almost on the brink of the Colorado river, which here flows below them at a depth of 1,500 feet.

Being so far above the surface of the arid plain on which they stand, they act as local condensers of moisture, getting such a supply of rain that their upper slopes are covered with luxuriant vegetation and growths of timber. Being so remotely situated, however, in an arid region, deeply carved in cañons, they are of no economic value for agricultural purposes, and have no mines, but are of great interest to the geologist from their position in this wonderful region, and the facility with which they can be examined.

Mr. Gilbert's report is exceedingly interesting and valuable in explaining the causes which brought about the extraordinary formation of the land in this part of the west, through which the rocks have been sculptured into their present shape, upon the law of divides and the influence of the rotation of the earth in deflecting the course of rivers. He believes as the result of this examination that the carving of the cliffs of the Colorado basin is not owing to mightier rains than we have now, but to an extremely arid climate, existing for ages. He thinks that the Saskatchewan river, which rises in the Rocky mountains, was formerly the upper course of the Mississippi, and flowed to the Gulf of Mexico, until, by the rising of the land in Minnesota, a barrier was created, which changed the course of the river, and by which Lake Winnipeg came into existence; and equally interesting are the views of Captain C. E. Dutton as to the manner in which the Colorado river originated, as the deepest part of a previously existing Tertian sea.

LANDS OF THE ARID REGION OF THE WEST.

Professor J. W. Powell has transmitted to the government a report on the lands of the arid regions of the United States, west of the one-hundredth meridian and east of the Cascade range, which is not only descriptive of the general features of this region, but contains an exposition of the conditions under which these lands may be redeemed from their present excessive aridity and utilised for agricultural purposes.

It appears by this report that the abundant rainfall in the eastern portion of the United States diminishes westward, until at last an arid region is reached, in which agriculture is not possible without irrigation. This region, Professor Powell says, begins about midway in the great plains and extends across the Rocky mountains to the Pacific ocean, except that there is a greater precipitation

of moisture in Western Washington and Oregon and the northwest corner of California, the winds impinging on this region being freighted with moisture, derived from the great Pacific currents, and where this water-laden atmosphere strikes the western coast in full force, as it does in the vicinity of the Columbia river, the precipitation is excessive, but rapidly decreases eastward to the summit of the Cascade mountains, this humid area being designated by the Professor as the Lower Columbia region. The especially arid portion is the great Rocky mountain region of the United States, and embraces more than four-tenths of the whole country, excluding Alaska.

My limits will not permit a further examination of this very interesting and important report, which points out what must be done by legislation to redeem a great part of this now worthless region, which cannot be accomplished simply by the efforts of individuals, but requires the adoption by the government of a general land system, organizing pasturage and irrigation districts, with provisions regulating water-rights connected with the land and the manner in which the waters are to be used to accomplish the general purposes of irrigation.

CALIFORNIA.

M. A. Pinard has explored a little-known tract of country in Sonora, at the bottom of the Gulf of California.

A section of a tree, the largest found in California, has been exhibited in this city. The tree is two hundred and forty feet high, and is computed to have been four thousand eight hundred and forty years old. The section exhibited was seventy-five feet in circumference, twenty-five feet across, and was capable of holding one hundred and fifty people. The interior was fitted up like a drawing-room, with a piano, a sofa, tables, and chairs. The tree grew near Tule river, Tulare county, California.

A NEW SURVEY OF THE MISSISSIPPI RIVER.

Mr. W. A. Wheeler has called attention, through the columns of the *Boston Globe*, to the necessity of a more extensive and thorough survey of the Mississippi river. In reference to the bill introduced in Congress for the survey of the region between the Upper Missouri and the Upper Columbia, he urges that the water-courses of this continent can be directed to the north coast of it; that the Mississippi can be virtually extended to Lancaster Sound, and give us an open water-way from the Gulf of Mexico far to the north of our present navigable limits. He says that the mouth of the Mississippi is the gateway to about fifteen thousand miles of water-way, and that there are avenues that lead to almost as many more, if a survey adequate to the future wants of the country were made.

SURVEY OF THE STATE OF NEW YORK.

Mr. J. T. Gardner has continued the survey of the State of New York, authorized by the Legislature, fixing the exact position of cities and villages in the most populated part of the State, and has found in nearly every instance that places were misplaced one or two miles on the existing maps. In respect to the general features of the country over which the survey has extended, Mr. Gardner says, "Colorado was not a greater surprise to me than has been the structure of my native State." He says that the study of its most remarkable features will awaken the deepest interest; that the configuration of a part of Central New York is as *unique and as unknown to science as that of any part of the Rocky Mountains.*

A more complete survey of the Adirondack region of the State has been made under an Act of the Legislature by Mr. Verplanck Colvin, with an efficient scientific corps. More than twenty-five of the high mountain peaks were measured,

and hundreds of miles of levels were completed, positions were located, stone monuments set, and a number of fine photographs were taken of remarkable places.

RAILROAD INCREASE IN THE UNITED STATES.

During the last two years 7,346 miles of railroad have been added in the United States, making the entire number of miles of railroad in it, 86,263—nearly one-half of the entire railroad mileage of the world.

WEST INDIES, CENTRAL AND SOUTH AMERICA.

WEST INDIES.

Mr. F. A. Hober, of Massachusetts, has spent some time among the islands of the Caribbean Sea, and devoted two months to the investigation of the Caribs, an interesting remnant of the aboriginal tribes of the American continent. In one or two of the smaller islands he found remnants of this people, now almost extinct, who were a powerful race upon the discovery of America. They were cannibals, and a strong and warlike tribe, when they were discovered by Columbus, making constant forays upon the neighboring islands and tribes, often to a distance of one hundred and fifty leagues, in their canoes, carrying off the handsomest women for wives and eating the men whom they took prisoners. To the Spaniards they were so formidable that they never attempted to enslave them. The remnant now found by Mr. Hober were a simple, indolent, happy people, the number among them of pure blood being very small. He describes them as a yellowish-brown race, with long straight hair, well formed in youth, but in age corpulent, the women marrying very young and getting old and wrinkled at an early period. He found, as other travelers have, that the women had one dialect and the men another, each being perfectly intelligible to the other. He describes them fur-

ther as very superstitious, and as having some dim conception of the Supreme Being and a vague idea of a future state.

Mr. F. Ober, who had been sent out by the Smithsonian Institution, brought to a close, in 1878, his examination of the islands of the Lesser Antilles, which embraced a thorough examination of Martinique and other islands of the Windward and Leeward groups. In the larger and more mountainous islands, he observed in ascending the volcano peaks three zones of vegetation, each zone distinguished by a different class of birds. In a retired part of the Island of Dominica he found a remnant of the aboriginal Carib race; and also visited the Caribs in St. Vincent, bringing back specimens of their ancient utensils, and taking photographs of their rock drawings and inscriptions.

Mr. Henry Fowler made a journey across the unexplored portion of British Honduras, but with no very important geographical results, passing through a rugged, hilly country, covered with dense forests.

INTEROCEANIC CANAL.

M. de Lesseps, with a corps of distinguished engineers has visited the Isthmus of Panama and re-examined the route for a sea-level ship canal from Aspinwall to Panama. The report of the engineers is that such a canal can be constructed for 180 millions of dollars, and that the serious obstacle of the close proximity of the river Chagres to the line of the canal and the river's rising at times along the line of the present railroad to a height of 40 feet, can be obviated by the construction of a dam 100 feet in height, by which the course of the river will be diverted in a different direction, and that the canal can be carried through the rocky ridge which crosses the isthmus by an open cutting.

It will be unnecessary for me to say anything further, as

the whole subject of the canal and of the various routes has recently been elaborately discussed before the Society in five sittings, specially devoted to that subject, embracing a full consideration of the advantages and disadvantages of each of the several routes, by a number of distinguished gentlemen thoroughly informed upon all the questions, many of them eminent engineers; the whole of which discussion was taken down, is now being printed, and will be issued in the Society's Bulletin in a few days.

FRENCH GUIANA.

Dr. J. Crevaux, a French traveler, explored the interior of French Guiana. He ascended the Oyapok to its sources, and from thence crossed to the Tumac-humac range of mountains, which form the water-parting between the rivers of French Guiana and the Amazons. He was not only successful in crossing the mountain range referred to, but was the first explorer that had been able to approach it for three centuries, and in his journey from Cayenne to the Amazons he passed through two hundred and twenty-five miles of an unexplored region. In a remarkably short space of time he continued his journey up the Amazons, ascending the main Amazons to the mouth of the Içá, and up that river, which is but little known, to its headwaters, crossing from there to the city of Pasto, on the Andes, and returning by the River Japura to the main Amazons. His entire route embraced four thousand miles, nearly one-half of which was along rivers, passing through regions inhabited only by Indians.

COL. ROBERTS' SURVEY OF THE ST. FRANCISCO RIVER.

Our associate, Mr. W. Milnor Roberts, now the chief of the Brazilian Railways, has surveyed the St. Francisco River in Brazil, from its mouth to its headwaters, completing his

labors last January. It is, he says, in a letter received at our Society, a very peculiar river, one thousand three hundred and two miles long from the ocean to the Falls of Perapora, and is one-half wider than the Ohio at Cincinnati, with a large volume of water at the lowest stage of the river. Two hundred miles from its mouth are the great Falls of Paulo Alfonso, with a higher elevation than the Falls of Niagara, though not, like Niagara, in one pitch. A railway is required seventy-five miles to connect the lower and upper rivers, which is now, he says, in the course of construction by the Brazilian government. About two hundred and sixty miles of the river has many rapids, all of which he ascended, and after this there are, he says, about eight hundred miles of fair navigation for light steamers.

SURVEY OF THE AMAZONS.

Commander Selfridge, U. S. N., was dispatched by the United States government to obtain accurate hydrographical knowledge of the lower course of the Madeira, the great affluent of the Amazon. The result of this survey, in which was included a tract survey of the lower Amazons as far as the mouth of the Madeira, is an excellent chart of the Lower Madeira for a distance of five hundred and seventy-eight miles to the Falls of St. Antonio, where the further navigation of the river is obstructed. The survey occupied about three months. Careful soundings were taken every few hundred feet, the result of which showed that the river can be navigated by steamers of eighteen feet draught for the distance stated up to the middle of July.

PATAGONIA.

Don Raymond Lista made an exploration in Southern Patagonia for the purpose of discovering the sources of the

River Chico. The expedition started from Puentas Arenas, in the Straits of Magellan, and the explorers, after studying the mineral products in that immediate vicinity, started upon their northern journey. The two northern sources of the Chico were examined, and afterward the southern source was explored. The large average stature of the Patagonians is confirmed by this exploration.

Signor Moreno, to whose explorations in Patagonia I referred in my address of 1878, declares that Magellan's Straits offer many advantages for settlement; that if these coasts were populated disasters from shipwreck would be greatly reduced, and that Patagonia, from Bahia-Blanca, has an excellent climate, and everything required for a great producing country. The last intelligence of this enterprising explorer was, that he had been captured by the Indians in Northern Patagonia. An English party, one of whom was Lady Florence Dixie, explored a considerable portion of the wild Pampas of Patagonia, penetrating into the Cordilleras. Parts of the region explored by this enterprising lady and her companions had never before been visited by civilized man.

DR. FINSCH'S EXPLORATIONS IN THE NORTH PACIFIC.

Dr. Finsch is exploring the less known islands of the Northern Pacific, chiefly with reference to natural history and ethnology.

EUROPE.

The Russian Government has been actively engaged in surveying the great rivers within its European boundaries. The Volga has been surveyed for seven hundred and seventy-five miles; the Chussowerga, one of the branches of the Kama, for two hundred and seventy miles; the Byclaya, another branch of the Kama, for one hundred

and sixty miles; the Don for five hundred and sixty miles, and the Byalka river was entirely surveyed.

The Italian Government instituted a general triangulation of the whole kingdom for a large and complete map of Italy, which commenced with Piedmont. With this triangulation was also connected a hydrographic survey, and in this branch the whole of the north of the Adriatic coast was completed, and the survey has been extended to Calobria, Sicily and Northern Sardinia.

ASIA.

NORTHERN ASIA.

The geographical explorations in Asia, especially in the northern part of it and in the countries now under the control of the Russians, have been very extensive. The Oxus, or Amu Daria, has been examined, and was found navigable throughout the entire length of the journey of the explorers, which was about one thousand miles. Little wood and but few inhabitants were found upon its banks, and in severe winters it is frozen over. Baron Amiroff surveyed the water-parting between the rivers Obi and Yenissei, and established the feasibility of uniting these important rivers. Explorations were made by M. Yadvinlseff in the South Altai Range; by M. Slovtsoff, in the region of Akinolinsk; by Mr. Mathieu, in Badakhshan; by Mr. Potanin, in the Hau-Kai mountains, near Lake Kasso-Gal, and by Mr. Pevtsofs, in northwest Mongolia. Colonel Grodekoff surveyed a route from the Oxus to Herat, and a new route has been discovered from the Caspian to the Sea of Aral, the principal part of which is by water—a very important discovery, as it is shorter by one-half than the previous route by the way of Orenburgh. M. Oschanin explored a part of the country of the Pamir, and made an attempt to cross the Pamir Steppes, in which he failed.

XUM

MOUNT ARARAT.

Mr. I. Brice succeeded in ascending to the top of Mount Ararat. He found the mountain mass to be about twenty-five miles long, from twelve to fourteen miles wide, and the circumference from seventy to eighty miles, the whole forming two peaks, joined by a sort of neck; the larger of the two, or Great Ararat, rising to a height of seventeen thousand feet above the level of the sea. Mr. Brice ascended the mountain, the ascent of which was so difficult that his assistants refused to follow him, and he reached the top alone. The upper part of the mountain was without snow or vegetation, although the mountain is surrounded by snow to the height of eleven thousand feet. When he reached the summit two strong blasts of wind swept away the clouds, and the view he obtained, he says, was "wonderfully grand and extensive." He describes Armenia as very barren and of great elevation, no part being less than two thousand five hundred feet above the sea. The climate, he states, is extremely hot and dry in summer and intensely cold in winter,. He considers the Armenians the most hopeful and vigorous race in the East. They have retained, he says, their nationality and character through a thousand persecutions and wars, and, as a race, now show exraordinary aptitude for commerce and the work of civil government.

ROCK CITY, IN ARABIA.

Mr. C. Doughty visited the so-called rock city of El-Heggi, beyond Damascus, which, in the days of Ptolemy, was an emporium for trade in frankincense and gold. It is one of the seven fabled cities of the Arabs, which was said by them to have been hewn out of the surrounding mountains, and to have had one hundred funereal chambers excavated in the rock. Mr. Doughty reached the place with great difficulty, and found it to consist only of the remains of what appeared to have been four or five palm

villages, each surrounded by a wall in the ordinary Arab manner. He discovered some sepulchral chambers, but they were very plain, with inscriptions cut in a panel over the doorways. This journey of Mr. Doughty has entirely dissipated the fabulous stories so long told about this place by Arab, Turkish and Persian pilgrims.

PERSIA.

Dr. Bastian, formerly President of the Berlin Geographical Society, and who, a few years ago, visited this city, has made a journey through Persia, the Padang islands and Java, with especial reference to ethnological researches; and Mr. N. A. Marieff has made a journey in the mountainous part of Southern Bokhara, finding mountain streams hitherto unknown.

An ancient canal, which formerly extended from the Euphrates to the Tigris, had silted up. The ancients, in cutting this canal to connect the Euphrates with the Tigris, cut it with an upward course, contrary to the flow of the Euphrates. It would have been comparatively easy to have dug out the old canal, instead of which, however, a new one was cut last year, in which the precautionary measure of the ancients was not followed, and, in consequence, the whole force of the Euphrates was thrown into the new canal, producing an immense overflow towards the Tigris, inundating hundreds of acres of valuable cultivated land. It is extraordinary that they should have so cut the canal with the example of the direction of the old one before them, but it is a characteristic illustration of the way in which things are done in the East under Mohometan rule.

AFGHANISTAN.

In connection with the English military occupation of Afghanistan, there has been considerable geographical work. Several expeditions have been despatched to obtain

accurate information for a topographical map of the country as far as Cabul, and with the expectation that sufficient material may be collected to construct a map of the almost unknown region of Kafaristan.

Captains R. G. Woodthorp and G. Martin, and Lieutenant M. Smith, who were attached to the expeditionary military force for geographical purposes, surveyed the whole of the Kuram Valley and the district of Khost to the south, making an addition to our present geographical knowledge of four thousand five hundred square miles. Captain R. Beaven has given a description of the country between Candahar and Girishk, which was traversed by the military division, under the command of Major-General Biddulph, in the early part of 1879. Lieutenant St. George C. Gore has described the Pishin valley, now annexed by the British government, about forty-eight miles long, and from twenty-five to thirty wide; and Major Campbell, the Shorawak valley, a narrow strip of flat country, about forty miles long and ten wide, which had never before been visited by Europeans; and Captain Holdich has given a description of some new routes to Candahar. One of the results of the military expeditions is, that the hitherto unknown region between the Pishin valley and the Suliman range, is open, rich and fertile, with nothing to prevent travel across it in any direction.

The almost unknown country of Kaffiristan was partially examined by Major Tanner, who, in a brief account of his journey, mentions as one indication of an advanced civilization, the superiority of the women, who, in contra-distinction to Asiatic habits in general, mingle freely in ordinary intercourse with the men.

THIBET.

Count Szechenyo, the Hungarian traveler, made a journey from China through Thibet, and attempted to reach Lake

Lob Nor from the side of China, but was prevented by Chinese officials. When last heard from, he had tried to make his way to Lhasa, in Thibet, but was compelled to return.

A native Indian explorer has surveyed the river Sanpu, the great river of Thibet, which was so long confounded with the Brahmaputra. He surveyed it downward for two hundred miles to Chetang, where it entered some hills towards the south, which he was unable to penetrate. It may be mentioned, as creditable to the present state of geographical science, that its true course and direction was found by him to be in accordance with the conjectures of the geographers.

Colonel Prejevalsky, to whose previous explorations I have so frequently referred, traversed the eastern part of the desert of Gobi from north to south, by a route leading from Hami to Sch-Chau, through an unknown country, by the way of Shatsheu. He found that at one point the desert attained the height of five thousand feet. At the oasis of Sch-Chau, which he says is very fertile, the elevation was three thousand five hundred feet. South of this he found a long mountain range, covered with perpetual snow, which he inferred extended as far as Lake Lob Nor, or its vicinity. After passing the desert he reached Zaidam, on the borders of Thibet, his design being when last heard from to reach Lhassa, which so many travellers in Thibet have attempted to do without success. It is a dangerous route, and intelligence just received has created apprehensions in regard to his safety.

CHINA.

Expeditions and journeys for geographical and missionary objects in China have, within the period under review, been very numerous. Mr. G. J. Morrison visited the Yellow River, the remarkable change in the course of which I described in a former address. He found the country through

which the river pursues its new course presenting a scene of the utmost desolation. He discovered that a portion of the river had changed since it was visited by Mr. Ney Ellis in 1872, and he declares that it is still changing, desolating the country through which it passes in these changes. He found that that portion of the grand canal which extends north of the Yellow River was completely dry. Mr. J. Cameron went from Pakhoi, in the extreme south of China, to Yunnan-Fu, and is, I believe, the first one who has made this journey. Some Belgian missionaries, with the Vicar Apostolic of the province of Kansu, made a journey across the extreme end of China, from Pekin to Louchow-Fu, the capital of Kansai; a portion of which was through parts of China almost unknown, and J. F. Brompton, a missionary, made a journey to Kweilan-Fu, which he found to be a large city, and a centre of commercial activity through its connection by water with Canton.

Rev. J. McCarthy went from Hankow to Bhamo, and has given a very interesting detailed account of his journey. Several years' experience, he says, confirmed a deeply rooted conviction that the truest protection for any one traveling among strangers is the knowledge on their part that he can do them no harm, and that the more he can make this apparent the better it will be for him and all that come after him. He found the large city of Yunan-Fu had formerly a suburb, of three miles in extent, the streets and houses of which, however, had been destroyed in the Mahometan rebellion; the city itself, he states, is not more than three and a half miles around the walls, the population residing chiefly in the southern quarters of it, and that a large swampy lake fills a great portion of the northwestern part of the city. He found Momien situated in the centre of a large and fertile plain, surrounded by a low built wall, forming a square about two and a half miles long, and the city itself in a ruined condition. From Momien he went to

Bahmo, and found the Shans, of whom the Chinese speak so contemptuously, a comfortable, well-dressed, well-fed people, in marked contrast with the Chinese. "I travelled," he says, "purely as a missionary, but glad at the same time to obtain geographical information; and the more frequently foreigners travel among the people without exciting hostility, the sooner will a more scientific and thorough knowledge of the country be obtained." He walked nearly the whole journey, was continually before the eyes of the people, and during the whole of the long course of it was never called upon to produce his passport, and never had occasion to appeal to any official for help or protection. He travelled on foot nearly two thousand miles through the west of China, from Hankow to Bahmo, and has gathered a great deal of interesting geographical and ethnological information.

Mr. E. Colborne made a journey from Chung-King, in the Chinese province of Sze-Chuen, to Ta-Chien-Lu, in the course of which he passed through part of Thibet, and obtained a great deal of information regarding the countries included in the general name of Thibet.

M. de Ujfalvy, while traversing Central Asia, visited the land of the Galtchas, Sarts, and Sadjicks, a Mussulman people, living in the patriarchal state, who are polygamists, and by whom women are held in great subjection. The Galtchas, in their wanderings, ascend the mountain slopes of Kohistan, and are an interesting people, as they range over the country, which appears to have been the extreme limit of the Aryan race, and where now the white and yellow races meet and partially overlap each other. In the Kuldja district the oblique-eyed Mongolians begin to predominate. It is a very interesting field for ethnological inquiry, which was the main object of M. de Ugfalvy's journey and the account of his investigation, which he is now preparing for publication, will be looked for with great interest.

XUM

COREA.

It will be remembered that about nine years ago Lieut. Grinnell, U.S.N., the son of my predecessor in the office of President of our Society, gave us an interesting account of what he was able to collect respecting Corea, in a journey to the northern part of it from Russia, the southern and principal part of the country having been closed for more than two centuries against all intercourse with the outward world. He failed in getting further than the outward boundaries of Corea, visiting only a few villages, and predicted that the naval expedition then sent out by the American Government under Admiral Rodgers would have no better success than the Russians and the French in the attempt to enter the country, a prediction which was afterwards fullfilled.

Mr. Ernest Oppert has since made three voyages in a steamer to Corea, and upon the second voyage he discovered the mouth of the Kang-Kiang river, upon which the capital of Corea is situated, about seventy miles from the mouth. Mr. Oppert steamed up the river for forty miles, and would have continued on to Saoul, the capital, but for the shallowness of the water. The result of this bold attempt was that he had many interviews with the people as well as with the authorities, the regent having sent a commission to confer with him. His effort to establish commercial intercourse was not successful; but during the negotiations he made long journeys into the country, either alone or attended by a single companion, and approached within a few leagues of the capital. He found the people not at all disinclined to intercourse with strangers, but that the opposition proceeded entirely from the rulers, and he obtained a great deal of valuable information respecting the country, its institutions and people. There is a rigorous division, he says, of the Corean races into castes, but very different from what exists in India, for instead of

the priesthood being one of the highest castes, they are one of the lowest. The ruling class are of the Aryan race, or, as he describes them, pure Caucassian; and he says if met in any city of Europe they would be taken for Europeans. The people are neither of Chinese nor of Japanese origin. They are taller and more powerful, with a caste of feature peculiarly pleasing, and those of the upper classes have luxuriant beards. As a people, he says, they are singularly honest, faithful, good-natured, firm and energetic. They have a great fondness for music, though their instruments are very primitive, and they are the only people, except the Phœnicians, who have invented an alphabet. There is no marriage ceremony; the bridegroom merely pays the stipulated price for his wife and takes her away with him. The women are kept in the greatest seclusion, but to indemnify them for this, a singular custom prevails. Every evening, at a certain hour, the city gates of the towns are closed at a given signal, upon which all men are bound to leave the streets, which are abandoned to the women for promenading and recreation. It is deemed a great offense against modesty to look at a woman then in the public streets, and any male finding himself by accident belated in the thoroughfares has to hurry to his home as fast as possible, holding his fan before his face, as the severest punishment would follow if he were discovered taking an inquisitive glance.

The Japanese government have been more successful than Mr. Oppert. They despatched a special commission to the Corean court, the result of which has been that a Japanese surveying officer spent three weeks in surveying the southern part of the country, and the commission have arranged for the opening of two ports in Corea for commerce with Japan.

INDIA.

The great survey of India has been continued. During the sixteen years of this survey, two hundred and ninety thousand square miles have been surveyed and mapped, including the wildest and most unknown parts of India.

NORTHWEST INDIA.

Major Biddulph explored, in 1878, certain tracts in Chitral and Yassin in the northwest frontier of India. In the Wurshigam and Kho valleys of this region he found a number of stone circles of huge boulders, about three feet high, with the flat side outward, which must have been brought to the spot from a distance with great labor. They were of the same general character as like circles found in France, Great Britain and other parts of Europe, and were evidently religious structures of a kindred race with those of Europe. He found the Chitrals a handsome people, with gypsy features and thievish habits—an interesting fact, as the gypsies are supposed originally to have come from this part of India. He describes a magnificent mountain looking down the Tarkhun valley, twenty-five thousand feet high, which filled the landscape and is the subject of many traditions. Major Biddulph's exploration resulted in a large amount of information of the region explored by him.

ASSAM.

Capt. R. G. Woodthorpe, R.E., made extensive explorations and surveys to the north and northeast in Assam, in which survey 1,500 square miles of country were accurately defined, and 400 square miles reconnoitered. The natives of the region, the Miris, he found to be a hardy race, of middle height, very wiry, and they appeared to be of the Tartar type.

MALAY PENINSULA.

In 1878 three Europeans and twenty-five Malays explored the high land in Eastern Perat, in the western part of the Malay Peninsula, a region never before visited by Europeans, and almost equally unknown to the Malays, the details of which are very interesting, but too numerous for me to attempt to give any general account of the journey. The expedition explored the sources of the Kinla River, and were the first to ascend the peak of Gimong Ream, as neither Malays nor Sakis go near it.

COCHIN-CHINA, CAMBODIA AND ANNAM.

Mr. C. F. Tremlett, as the result of ethnological investigations, says that the Indo-Chinese peninsula, which embraces Cochin-China on the south, Cambodia on the west and Annam on the east, was at one time inhabited by a people of Malay descent, from Cape St. James, in Cochin-China, to the Chinese peninsula, and that the present Annamese are of this race, modified by Chinese inter-mixture. He declares that the Cambodians differ entirely from the Chinese, the Annamese, and even from the Siamese, with the last of whom they are somewhat intermixed from the contiguity of the two countries. The British Consul at Saigon states that the native races in Annam, especially in the northern districts, where the races have remained more distinct, have the great toe of each foot separated from the others, like the thumb of the hand, and that it is used by them in the same manner as the thumb, though only to a limited extent. He says that this peculiarity is of great antiquity, being mentioned in Chinese annals, assumed by the Chinese to be as old as 3300 B. C.

JAPAN.

The geological survey of Japan, under the supervision of Mr. B. S. Lyman, has been carried on during the past year, which has been chiefly devoted to the examination of the oil lands, and to a general geological reconnoissance of the whole country, so as to ascertain in what parts detail surveys are most important.

Mr. A. R. Atkinson, together with Professor Dixon and a Japanese, Mr. Nakozawa, crossed Japan from Tokio, examining the mountainous regions in the provinces of Shinshin, Aida, and Etchiu, ascending in Hida the sacred mountain Haku Haku-san, this sacred mountain being one of many peaks in an extensive range, of which journey Mr. Atkinson made a sketch map, accompanied with tables, giving the approximate heights of places. They reached the summit of Haku Haku-san which is eight thousand seven hundred feet above the level of the sea, and the view from the top is described as magnificent. The result of this journey is a considerable amount of new geographical information respecting the mountain ranges, their direction, heights, and of the country through which the explorers traveled. They ascended also the peak of Gohonsha, about nine thousand two hundred and fifty feet above the level of the sea, where they found a body of pilgrims, and witnessed an interesting religious ceremony on the summit. Mr. J. Milne has collected considerable information respecting the aboriginal races of Japan, embracing an account of shell heaps, stone implements, small conical pit dwellings of a people called Koshito, said by the Japanese to be a race of dwarfs, and of inscriptions, mounds, implements, pottery, the caves of cave dwellers, and other remains.

LOO CHOO ISLANDS.

An American, with whose name I am not acquainted, visited the Loo Choo Islands, of which little comparatively has been known since the visit there of the *Alceste* in 1816. He says that the natives, who dress like the Japanese, resemble the Malays in feature, although they are of a lighter hue. He found them mild, intelligent, and very kindly in disposition. The women, he says, many of whom are handsome, work very hard. They do most of the field labor and of the carrying, poising their loads on their heads Their hands are tattoed with ink, which is begun in their fifteenth year, the design becoming larger as they grow older, and by the time they are thirty, he says, their hands look as though they were dyed in ink. In their marriages it is the mother of the bridegroom who determines upon the bride. The bride, when selected by her, has to work diligently for the mother-in-law during the allotted period of probation, and if she fails to please her, is sure to be rejected.

AFRICA.

The explorations in Africa have been so numerous that I shall have to follow them somewhat in geographical order:

NORTH AFRICA.

Mr. C. Tissot, who has been engaged in researches in Tunis, has explored the course of the Medjerda, finding many remains and inscriptions of the Romans.

Mr. Gerald Rohlfs, whom we had the pleasure of hearing before our Society some years ago, was sent out by the German African Society to explore the Kufarah Oasis in North Africa. He reached Kufarah, when the expedition was surprised, plundered, and the Doctor and his companion,

Mr. Stecker, were compelled to return to the coast, which which was reached with great difficulty. He has still, however, determined to reach the oasis with another expedition in a new direction.

Subterranean Lake.

A wonderful subterranean lake was discovered last year at Hemelan, Algeria. The cavern explored was very high. It was covered with stalagmites of the most brilliant colors; and from the bed of the lake arose large stalagmites to the roof, looking like gigantic columns expressly erected to sustain the enormous arches of the cavern. The lake was about two miles and a half in length, and about a mile broad; fish swarmed about the raft with which the exploration was made, and when taken up were found to be blind.

So far as it was explored, it was an immense natural basin, supplied by powerful streams of water flowing in through fissures.

Flooding the Sahara.

The subject of flooding the Sahara, to which I have so frequently referred, has been recently considerably discussed. It is not now doubted, from the result of Capt. Roudaire's survey, that this could be done; but many eminent men in France are of the opinion that the result would be injurious, instead of beneficial. Prof. C. Martens and Mr. E. Dassaur declare that it would destroy the date culture, without exercising any favorable influence upon the climate of Algeria, as the vapors arising from the projected internal sea would be driven south into the Sahara, as northerly winds prevail. Dr. Cussan declares it would not attract trade to the Soudan, but, on the contrary, would facilitate the obtaining of arms and ammunition by the independent and warlike tribes, who would be more dangerous than before; and that the salt water would affect the wells of the

whole country, as he thinks the sweet waters of the Chotts communicate with subterranean waters that feed the springs.

Dr. Rohlfs considers that the Sahara could be irrigated by wells in the bed of the ancient water-courses and by artesian wells, as was formerly done, many of which have been filled up by the tribes to prevent invasion, thereby greatly enlarging the area of the desert and contracting the oases scattered throughout it. Wherever a well is dug, he says, the desert becomes fruitful, the palms grow, as the sand after being well watered becomes fertile, and that water is found in depths from twenty-five to one thousand feet.

NORTHWEST AFRICA.

Mr. D. Mackenzie, to whose scheme for flooding the great Sahara from the West Coast I have heretofore referred, has, after great difficulties, succeeded in making a settlement at Cape Juby, on the Northwest Coast, from whence, he thinks, a large and important trade can be opened up with the interior of North Central Africa.

Mr. G. Schutt, who was sent out by the German-African Society to complete the labors began by the lamented Dr. Mohr, reached Malange by the way of Loando; but, in proceeding further in the Mai country, his progress was stopped by a son of Muata-Yambo, and the impoverished traveler found his way back through the country of the Bangarah to Malange.

Discovery of the Source of the Niger.

Mr. Soleillet ascended the Niger, with the design of penetrating in that direction to Timbuctoo, and from there to Algeria. He failed, however, and was compelled to return to the French settlement of St. Louis on the west coast, with the determination to make another attempt to reach Timbuctoo by the way of Tishet.

Last year, Mr. Verminck, a wealthy merchant of Marseilles, and the owner of numerous trading stations on the West Coast, determined, in view of the importance of the Niger, to renew the attempts that have been heretofore made to ascertain the sources of this great river. He accordingly despatched two of his agents, Messrs. Zweifel and Moustier, for this purpose. In the course of their journey they ascertained the interesting fact that the negroes, finding they derived great material benefit from the commerce in palm oil, had cleared off great tracts of forest land for the cultivation of this valuable tree, and the explorers, in their march, counted more than fifty thousand young palms that had been planted, and found that a law had been enacted by the natives condemning to slavery any one who should cut down a young palm.

Without detailing the particulars of their journey, it will suffice to state they were enabled to determine the exact position of several tributaries of the Upper Niger, and finally succeeded in reaching the stream which may be considered as the true Upper Niger, called, in the native language, the Tembi, the source of which they ascertained to be near the frontier of Koranko, in the vicinity of a village called Konlako. Their journey was one of great difficulty and suffering, owing chiefly to constant torrents of rain.

Liberia.

The government of Liberia has peaceably annexed a large territory west of the narrow strip along the coast heretofore constituting Liberia—an annexation highly beneficial to the native people of the territory now brought within the confines of Liberia, and which will greatly advance its resources and influence as a state.

The River Ogowa.

Lieutenant Savarin de Braza, whose efforts in the explora-

tion of the river Ogowa I have previously described, in connection with Mr. Marche and Dr. Bellay, has returned to Europe, after three years of exploration, attended with great difficulties and trials, which has resulted in a very complete account of the river, which he has proved to be entirely distinct from the Congo, and to have no connection with any interior lakes. He divides the Ogowa into three almost equal parts, the middle portion of which follows the equator as nearly as possible, and the other two incline about 1½° southward. His last exploration, in 1878, was attended by the discovery of an important river, the Alima, about five hundred feet wide and sixteen feet deep, which appeared to be an affluent of the Congo.

In attempting to descend this river, the explorers had, like Stanley, to run the gauntlet, encountering hostile savages, who lined the river banks. They passed great villages, filled with enemies, who finally attacked them in canoes crowded with men armed with guns, so that Lieut. de Brazza was compelled to abandon the further exploration of the river, and after great sufferings, hunger and fatigue, finally reached the French settlement at the Gaboon. During the last months of their journey, he and his companion, Dr. Bellay, had to march bare-footed, their legs covered with sores, and half-starved, during which eight hundred miles of ground was covered, more than half of it on foot, in a region hitherto unexplored, as large as Belgium. Lieut. de Brazza's labors will greatly help to solve perplexing problems of African hydrography in this part of Africa.

In a recent paper on the races of the Gaboon and the Ogowa, Lieut. de Brazza questions Mr. du Chaillu's statement about the Fan cannibals and what he saw in their villages. He thinks that Mr. du Chaillu must have been misinformed by accounts he had received from races at war with the Fans. Lieut. de Brazza describes them as a kindly,

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generous and courageous people, and complains of the prejudice excited against them by Mr. du Chaillu. He admits that they are cannibals and eat their prisoners, but that it is from an idea that if they eat the heart of a great man, his courage would pass into them. It is very evident from this statement that Lieut. de Brazza has never read Mr. du Chaillu's book, or, if he has, has forgotten it, for Du Chaillu gives exactly the same account of the Fans that he does, merely mentioning in addition that he had heard that some of them dug bodies out of their graves and eat them while at the Gaboon, and mentions persons there who had heard the same statement. This is not the first time that the accuracy of Mr. du Chaillu's statements have been called in question. It was denied that he had ever seen any such animal as a gorilla, and that his statement that he found in this part of Africa pygmies like those mentioned by Herodotus, was declared to be a fabrication. In every instance, however, Mr. du Chaillu's statements have been verified. A live gorilla has since been brought from Africa and exhibited in Europe. Other travelers have verified the existence of the pygmies and M. de Braza himself found the Akkas, the dwarf race first seen and described by Du Chaillu, giving substantially the same account of them.

WEST AFRICA.

O. Schuett undertook to trace the course of the Kassai or Kassabi to its supposed confluence with the Congo. He was prevented from doing so, however, by the natives, but made a large survey of an hitherto unknown country between the Cuango and the Kassai.

The lower course of the river Cunene has been explored by three Portuguese naval officers, Messrs. Lima, Kueriol and Silva. The river reaches the sea about 17° S. lat., but is unapproachable at its mouth, owing to sandbanks. The exploration was accomplished, but it was one of great diffi-

culties and hardships, owing to drought and the obstructions in the path of the explorers.

An agent of the English Church Missionary Society ascended the river Binue from its confluence with the Niger, in a small steamer, to a point eight hundred miles from the sea, making a careful survey of the river and penetrating the country for one hundred and fifty miles beyond Hamaruwa; and F. Spier spent two years in the exploration of the river Gambia, and penetrated farther up that stream than any civilized man has hitherto reached.

STANLEY'S RECENT LABORS ON THE CONGO.

Mr. H. M. Stanley, as the head of the expedition to the river Congo of the African International Association, founded by the King of the Belgians, is now engaged in the attempt to establish a line of stations along the Upper Congo, as far as Nyangwa, on the upper part of the Congo, to unite there with stations to be established by the association from the east coast. A steamer was dispatched by the association, drawing fourteen feet of water, to ascend the river, with a cargo consisting of materials for houses, huts, tents, provisions, arms and general merchandise for the establishment of the first station, at a point near the Yéllah Falls. She took with her, in sections, a small steamer, capable, when put together, of carrying thirty persons, intended to run upon the Upper Congo, above the Falls, and also three undecked steam launches, and three large flat-bottomed boats drawing sixteen inches.

The last intelligence from Mr. Stanley is that he has founded the first Belgian station at M'Vivi, on the Congo, about one hundred and thirty miles from the coast and five miles below Yéllah Falls, where an iron and a wooden house has been erected. From there he went into the interior with a well equipped expedition of sixty-five natives and fourteen Europeans. One of the steam launches

was lost over the falls, and the remainder, with the materials for houses, had to be carried over a mountainous country, where the explorers will have to contend with enormous difficulties for three hundred miles before they can again make use of the river. A second station was to be established at Stanley Pool, above the falls, and two others in the far interior. Mr. Stanley is to make a thorough exploration of the Western Congo and of the countries upon its banks, and declares that it will take three years to carry out his present plans.

REV. T. J. COMBER'S EXPLORATION IN CONGO.

The Rev. T. J. Comber penetrated from the British missionary station at the foot of the Cameroon mountains, through an unknown region in the country of Congo, to Makuta. He describes Makuta as a town of two hundred houses, handsomely laid out in streets and squares, which are regularly swept, and embellished with trees trimly kept by a native people fond of ornament, and that he has never seen so pretty a town in Africa, nor in any part of it such real taste and neatness. Major Burton has declared that nothing could be more beautiful, picturesque and charming than the Congo river below the Falls. Mr. Comber has since been sent out by the Baptist Missionary Society of London, to establish a mission on the river Congo above the Falls, with the aid of a small steamer which was to be sent out in sections.

CENTRAL AFRICA.

Commander Cameron has recently given an account of the people of Urana, one of the largest of the native states of Central Africa, where the respect for sovereignty and rank is so strictly enforced, that no one is allowed to sit in the presence of the king or of a superior without permission, which is very seldom granted. Many of their customs are

curious. They will not eat in the presence of each other, nor drink whilst any one is looking on, but if obliged to do so will hold up a piece of cloth as a screen. Ventriloquism is practised amongst them for religious deception; idols by this instrumentality being made apparently to speak. They allow their beards to grow very long and plait their hair like the Chinese, attaching a clod of earth to the pigtail to make it hang down. They have a very effective mode of communicating messages by the beat of a drum. It serves as a kind of telegraph, by which messages are sent and answers received over immense distances, and is much used in war in bringing up and concentrating forces.

MAJOR PINTO'S EXPLORATION ACROSS AFRICA.

The most remarkable of the recent explorations in Africa is that of the Portuguese explorer Major A. A. de Serpa Pinto, in his journey from Benguela, on the western coast, across the African continent to the Zambezi river, and thence in a southeasterly direction through the Mâtabeli kingdom and the Transvaal Republic to Natal on the Indian Ocean. This journey is remarkable, not only from the circumstance that a considerable part of it was through an unknown region to the south of the route pursued by Cameron, but from the fact that although it was attended with constant perils, trials and difficulties, this accomplished scientific traveller was able, by constant observations, to fix the position astronomically of every material point in his route. In respect to the astronomical and topographical observations, it is one of the largest contributions to the science of geography that has ever been made by a single traveler in a land journey of such length through savage tribes, which will be indicated when I mention that his diary fills five volumes of closely written matter set down with great exactness, and full of valuable geographical, topographical, barometical, meteorological and astronomical information.

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Major Pinto had the advantage, not only of having lived for a considerable time in the Portuguese colonies of Western Africa, but also of being a very thorough scientific geographer, and it was for this reason that he was especially selected by the Portuguese government in connection with a general system of exploration instituted by that government, to explore the regions lying between their colonies and Victoria Falls, on the Zambezi; an expedition which he was left to undertake with little or no pecuniary aid. "I performed my journey," he says, "with scarcely any resources. I and my party had to live solely from day to day upon the product of the chase, and thus, with occasional help from friendly natives, I accomplished my very difficult task;"—to which should be added, that the natives accompanying him were almost entirely men belonging to a cannibal tribe. He started from Benguela, on the West Coast, November 12th, 1877, and arrived at the end of his journey in Durban, on the Indian ocean, on April 14, 1879, a journey occupying nearly twenty months. The first point reached was Bihè, where he was confined for three months by an attack of fever, though Bihè is comparatively healthy; and even when he departed from this place he was yet in a state of extreme weakness and exhaustion. He is a small, spare man, thirty-four years of age when he undertook this journey, and it seems incredible, says one who saw him after his return, that a man with so small a frame and so apparently weak, could endure such hardships and accomplish such a journey. He preserved his astronomical instruments by a very simple device. In trusting his chronometers to one of his native servants he said, "You see this makes a noise; you must never let this stop; bring them to me every day so that I may see that they are going; for the day that you forget to bring them to me you will be roasted alive;" and the superstitious attendant, in constant fear of the supposed spirits within, and to keep

them quiet, punctually wound up the chronometers every day from that day forward. Once they were attacked by a numerous band of savages, who kept their baggage, including the chronometers, and while Major Pinto was lamenting their loss the following day, they were brought to him by the same attendant, who swam across a river and, watching his opportunity, obtained them from the place where the savages had deposited them.

In the limited character of my address, I cannot follow him through the whole of his extensive journey, but can refer only to some of the incidents and some of the information he obtained. He discovered the source of the river Cubango, West of Bihé; and, shortly afterwards, two of its affluents, finding the river to be contrary to all the descriptions of it on the maps. He says, in speaking of those affluents, "I use the words small rivers, but the smallest in Africa are almost always enormous ones." He found the river Cuqueima, to his surprise, running to the north, which was contrary to its position on the maps, and flowing from the north to the southwest, towards the Quango, of which it is an affluent. He afterwards struck the Quango, flowing to the north, and the Cuito, an affluent of the Cuando, running to the south. All the great rivers, he says, of South Africa have their sources in an immense rich plain, which is in 12° S. lat. The way in which rivers in this part of Africa take their rise and are formed, as described by him, is interesting. They begin with a slight humidity, resembling the trickling of a small fountain. By degrees, the current swells, and suddenly, without having received any visible affluents, it becomes an enormous river, on which any one may sail with a boat. He says he saw the source of the Cuando, first as a tiny rill, which flowed between his feet; that a little lower down, he descended it in a canoe, and that from thence, it was quite navigable, till it enters the Zambezi, where Livingstone calls it the Chobe,

a name which Major Pinto says is utterly unknown at the present day in Africa. Not only is the Cuando navigable, but also many of its affluents; and there is a cataract at its extremity, which nearly proved fatal to the explorer, as it had not been previously mentioned by any one. There is, he says, no connection by water between the Cuando and the Cubango. While in the region of the Cuando, he met one of the most curious discoveries in his journey. He found that one of the carriers supplied to him by a friendly chief, was, to his astonishment, a white man, belonging to a race in Africa heretofore entirely unknown. This race, called the Cassequer, he says, exist in large numbers in this part of South Africa, and that they are whiter even than the Caucasians, with this distinction, that instead of hair, their heads are covered with small tufts of very short wool, that they have prominent cheek-bones, and eyes like the Chinese. He states that he has seen girls with such a complexion that, if their features were European, they would pass in Europe for beauties. Lieut. de Braza is of the opinion that this race of people came from North Africa, as he states that he has seen a race greatly resembling them, called the Ubamlo, south of the Congo. The men of this white African race, Major Pinto says, are remarkably muscular and robust, and that when they discharge an arrow at an elephant they bury the entire shaft in the animal's body. They live by themselves, subsisting on roots or the spoils of the chase; and it is only when their supplies fall short that they hold any communications with their neighboring race, the Ambuelos, from whom they obtain food for ivory. He describes them as a nomadic people, never sleeping two nights in the same encampment; that they wander about, in groups of from four to six families, over all the territory that lies between the Cuchi and the Cubango, and that they are the only people in Africa that do not cook their food, eating it raw. He

makes the interesting statement, that it is the crossing of this people with the negroes that has produced, in his opinion, the race of mulatoes so well known in the lower part of South Africa, by the name of Bushmen; a race who differ from those from which they have sprung, as they cook their food, and are of a good disposition, though quite opposed to civilization. Mr. A. Alexander, to whose interesting researches in South Central Africa I shall presently refer, states, on the contrary, that the Bushmen are the aboriginal people of Matabeli Land, an extensive country lying north of the Transvaal Republic. He says, that unlike their allied races on Cape Colony, they are a fine, well-made people, but that in the land of their origin, which is controlled by another race, the Matabeli, they are treated by their conquerors like game, being hunted and killed for the mere pleasure of a day's shooting. When exploring the Kalahari desert, his assistants were principally Bushmen, whom Mr. Alexander declared to be the best behaved of all the black races that he has met with in Africa, and the most ill-treated.

In the course of Major Pinto's expedition, he found the river so abounding in crocodiles, that he and his negroes had to construct a bridge across it, which they effected in three days. He found tombs everywhere, through a territory otherwise quite desolate. What they had to endure in this part of their route may be inferred from the fact, that they travelled without food for nearly five days; and even when they obtained some canary seed, had thereafter a long interval of fasting of from forty to forty-eight hours, and in some points, came near perishing for want of food. At last he reached a friendly young chief, of the age of sixteen, who, with the generosity of youth, presented him with thirty oxen. He now found that those who had come with him from the west coast, wished to return, upon which he called his people together and said:

"You may go if you wish, you are free. I have nothing to give you, I do not wish you to submit to my fate, for I cannot foresee what may befall me;" upon which the blacks of Benguala, from the west coast departed, but the natives who had joined him at Bihé, being a race of travelers, adhered to him. He obtained a map drawn by a negro of Bihé, showing that the southern extreme source of the Lualaba—or, as we must now call it, the Congo—lies between the sources of the Zambezi and the Luangua, at 12° S. lat. The Luangua, sometimes called the Cafugue, he says is without cataracts, is navigable for 600 miles, and may hereafter become the best channel for penetrating through the centre of Africa. It is the river which Livingstone called the Carue, and Major Pinto declares that the exploration of the Luangua is at the present time the most important problem to be solved in Africa. He states that the river that connects Lakes Benguela and Moero is not the Lualaba, but the Luapula, as the Portuguese travelers, the Pombeiros, long ago declared. The Lualaba, he says, is the source of the Congo, and not the Chambeze, which simply prolongs Lake Benguela to the west.

The perils and sufferings encountered were so great that he was at last abandoned by all but two or three faithful blacks, whom he brought back with him to Lisbon, and who sat by him on the platform while he was giving the Geographical Society of that city, in the presence of a crowded audience, an account of this remarkable journey.

I cannot follow him in the description of the perils he and his companions encountered in descending seventy-two cataracts on the upper Zambezi. He says he saw thirty cataracts in the space of an hour and a half, that have never been mentioned by any one. He declares that in this perilous descent he was near perishing, not only from the cataracts, but from hunger; that fear never left him for an instant, and that between the intervals of delirium, he did

his best to land and make a map of the cataracts and the banks of the river.

The whole of the country of the river he found well peopled, except immediately above the cataracts. Here, in this out-of-the-way region, he encountered an English naturalist, Dr. Bradshaw, reduced to the greatest misery, having nothing on him but a tattered shirt and a pair of trousers in a most ruinous state, who made his acquaintance with the greatest sang-froid, gravely presenting him with his carte-de-visite, printed in London.

Further misfortunes attended the intrepid explorer. He was attacked by fever, and owed the preservation of his life to the attention of the wife and niece of a French missionary, Coillard, "but no sooner had I recovered," he says, "after twelve days of unconsciousness, than the idea of continuing my discoveries became more intense than ever." He did not follow the lower course of the Zambezi, as it has already been sufficiently explored, but proceeded to Shoshong, near the river Limpopo, a territory which has been christianized and civilized to an extraordinary degree by the missionaries, McKenzie and Price. His journey from there to Pretoria, the capital of the Transvaal, was full of incidents; and from Pretoria he was able to transmit to Lisbon, intelligence of the accomplishment of his journey. Out of four hundred followers eight only arrived at Durban on the Indian Ocean.

Some of the results of this journey may be stated. He declares that fevers prevail all along the river banks of the Zambezi, and in the lands adjoining the river, but that the country extending inland from the highlands of Benguela, is the most suitable territory in all tropical Africa for colonization, being five thousand feet above the sea, fertile, well watered, and healthy. The people, he says, are docile, capable of improvement, are very fond of dress, and that a market would here be found for the consumption of foreign manufactures.

DR. HOLUB'S EXPLORATIONS.

Dr. Holub, to whose labors I have heretofore referred, has returned to Europe, after spending seven years in exploring the interior of Africa north and south of the Zambesi. His first two expeditions were among the Bechuana tribes, and his third and greatest was in the country of the Zambesi, which lasted twenty-one months. He surveyed the river with great care, making a chart on which every island, rapid and inflowing creek is accurately laid down. He gives a very interesting account of a people found by him in the southern part of Central Africa—the Marutse—who differ materially from those in the southern parts of Africa. They have great reverence for the Supreme Being, believe in a future state, and are distinguishable from others by the esteem in which women are held, their rulers being more frequently queens than kings. The slave trade was not allowed among them. They were traders in ivory and other articles, and had some knowledge of the arts; showing them to be a people much in advance of those usually found in savage Africa. Dr. Holub took great pains to obtain as full a knowledge as possible of the region between the diamond fields of the Orange Free State and the Zambesi, measuring the distance by counting every step he took in a march of two thousand miles. All this was achieved without any pecuniary assistance and without shedding a drop of human blood, although he travelled among the most savage tribes unprotected and at times too weak to have fired a gun in self-defence, which was the manner in which Livingstone and Du Chaillu travelled; and I may mention, as admonitory to future travellers in savage regions, that when the principal king of the Zambesi regions heard that Dr. Holub wished to visit his dominions he said: "If he will travel after the fashion of Monari (which is the African name given to Livingstone), then let him come, but not otherwise." I may mention an interesting fact in respect to this distin-

guished African explorer and of Livingstone's influence upon his future career. When Dr. Holub was a boy of thirteen years of age he taught the children of a widow lady for a stipend of a dollar and a half a month, to enable him to buy a copy of Livingstone's travels that he had seen in a shop window. At the age of twenty-five, after graduating as a physician at Prague, he went to South Africa with only one hundred and fifty dollars in his pocket where he has been exploring for seven years. Our own countryman and fellow-counsellor, Mr. Du Chaillu, was only nineteen years of age when he penetrated to the savage cannibal tribes east of the Gaboon, in the same successful way as Livingstone and Dr. Holub, discovering the gorilla and pigmy akkos, and bringing back to this city those remarkable specimens of working in metal and other handicrafts of the cannibal tribes, among whom he sojourned with entire impunity. Mr. du Chaillu then declared that the true way of exploring Africa was for the traveller to go unprotected and alone, which Livingstone and Dr. Holub have done. The last few years of our distinguished associate's life has been devoted to a thorough exploration of Scandanavia, especially Sweden, Norway, Finland and Lapland. We wait with great interest for his forthcoming work, which, from a portion of it that I have read in manuscript, will, I think, be far more fascinating than even his African travels, attractive as they have proved to readers in all countries of every age and sex.

MR. A. A. ANDERSON'S EXLORATIONS OF GREAT, HEALTHY AND FRUITFUL REGIONS IN CENTRAL AFRICA.

The country traversed in part by Dr. Holub has been, since 1864, the field of exploration of a resident explorer, Mr. A. A. Anderson, who, in 1878, communicated the result of his researches to the official government of Pretoria, which are of great interest and value. He has

surveyed the region north of the Orange river, in what is known as Great Namaqua Land and the northern portion of the Kalahari Desert up to 16° S. lat. The Matabeli country he estimates as one hundred thousand square miles in extent, under one king, large portions of which are thickly populated, but to what extent he was unable to estimate. The Makumba country, bounded on the north by the river Zambeze, and on the east by the Portuguese settlements, he puts down at about forty thousand square miles, ruled by the Makumba and other chiefs, having under them a large and industrious population. A region stretching from the Makumba country on the north to the river Limpopo on the south, and from the Matabeli country on the west to the Portuguese settlement on the east he estimates at seventy thousand square miles, portions of which are thickly populated by a people who raise and manufacture cotton.

The country about Lake Ngami, ruled by a single chief, is stated to be forty thousand square miles, with a population of twenty thousand. Ovampo Land, on the west side of the Kalahara Desert, is given as sixty thousand square miles of country, with a population of thirty thousand, a splendid grazing country, which is well watered, has mountains rich in minerals, and is inhabited by an industrious people.

The Damara country, recently annexed by the Cape Government, extends from the sea to the Kalahara Desert; the coast line being but a sandy waste, but the eastern portion, he says, is rich in minerals. Great Namaqua Land, below this, and running south of the Orange river, which also extends from the sea to the Kalahari Desert, has a coast line which is also a sandy waste; but on the eastern border, near the Great Fish river, there are good grazing grounds, and mountains rich in minerals. He estimates it at seventy thousand square miles in extent, with a population of about twenty thousand, living under petty chiefs, who are lawless and dangerous.

He gives an interesting account of the country, lying east of the Kalahara Desert down to the British colonies, the details of which are too extensive for an address like this. In general terms he says that from the British colonies on the south up to 16° S. lat. there are nine hundred and fifty thousand square miles south of the Zambezi, and fifty thousand miles north of that river, exclusive of the Portuguese possessions either on the east or west coast. From 1869 to 1872 he was engaged in the survey of the Kalahara Desert, which had never been explored, and which, he says, could be made one of the finest countries in South Africa, and that it is a splendid field for emigrants. He considers the Mashoua country now closed by the chief who rules there as affording a great field for enterprise in the cotton growing region of it, which covers a large area, and from which a water carriage to the east coast could be made at little expense. Gold, silver, and other minerals abound, rice is extensively cultivated, spices of all kinds flourish, and the tropical fruits, such as oranges, lemons, &c., arrive at great perfection. He says the fever districts of this part of Africa are confined to the Portuguese settlements on the east coast, the land along the valley of the Zambezi, the tract of country east of Lake Ngami and from that lake to the Cuando and the low country up to Victoria Falls. That large portions of Matabeli Land, and the Mashoua district are free from fever; that on all the uplands and mountain ranges fever is unknown, and that from the west of Lake Ngami, through the countries already described, it is exceedingly healthy, like the Transvaal territory. I have enumerated these details, the information being derived from so reliable a source, to show what an extensive region exists in this part of Africa adapted from the fruitfulness of the soil, the healthiness of the climate and its mineral wealth for the future abode of civilized man.

EAST AFRICA.

The expeditions in East Africa during the past two years have been very numerous. Their object has been less the discovery of new lands than the thorough exploration of the countries already discovered, with a view of establishing stations and missionary settlements to facilitate communication with the numerous tribes dwelling in the healthy countries of the interior, the suppression of the internal slave traffic, and the bringing of valuable regions in this part of Africa under the influence of civilization.

Lake Ukerewe (Victoria Nyanza).

The expedition of the Church Missionary Society reached the head of Lake Ukerewe (*Victoria Nyanza*) from Zanzibar, and another portion of it, which proceeded up the Nile, was equally successful in reaching King Metza's dominion. Great apprehension was felt for the fate of this latter expedition from intelligence that King Metza was opposed to it, which has been dispelled by more recent information, and there is every indication that the mission will be successfully established.

Lake Mwutan Nzige (Albert Nyanza).

Mason Bey made a survey of Lake Mwutan Nzigi (*Albert Nyanza*), which has considerably reduced its area from the survey previously made by Gessi, but he did not succeed in solving ths question whether Beatrice Gulf, visited and named by Stanley, formed a part of the lake or not, so that the region south of the lake is still involved in much uncertainty.

Shoa.

The Marquis Antinori's expedition, to which I have so frequently referred, has proceeded beyond the boundaries of Shoa, the country lying immediately south of Abyssinia;

but the Marquis has returned to Italy, bringing back a large amount of scientific information. Signor Chiarini started, in 1778, for the Kaffa country, and when last heard from he and Signor Ceechi afterwards advanced to the country of Djumina, where they were captured by a native chief and had been subjected to forced labor of the most painful kind when they were last heard from.

Somali Land.

M. Reovil has made a journey into Somali Land, the country, as I have before stated, supposed by Dr. E. B. Tyler and other archæologists, to be the country from whence the ancient Egyptians originally came.

Mr. Reovil's account of his journey is exceedingly interesting. He was kindly received by the people, and he states the curious fact that they are governed by a system of laws having much analogy with that which prevailed in Europe during the middle ages. He found one of the customs of the middle ages still subsisting—the ordeal by fire. The people, like the Egyptians, have a profound respect for the dead, and especially for those who have fallen in battle. They are a people who have always succeeded in preserving their independence, having a thorough military organization, the children being sent at an early age to school, where they are taught not only to pray, but the use of arms, that they may be able thereafter to defend their liberties.

Galla Land.

The German scientific expedition, under C. Denhardt, started from Melinda, on the northeast coast, to explore the course of the river Tana, or Dana, which has been supposed to take its rise in the snowy region of Mount Kenia. They explored the river, and reached the spot where Mount Kenia has been indicated upon the map from various reports, but found only level plains; and, although they

questioned more than two hundred persons, found no one who had even heard of that mountain.

The Rev. Thomas Wakefield, to whose labors I have frequently referred, made a journey from Malinda, on the northeast coast, to the country of the Bararetta Gallas, between the rivers Tana and Sabaki, examining especially the Galla districts of Sigirso and Kashé, lying in a northwesterly direction, in which region he found a group of lakes. The country, he states, after a three months' residence, is very fertile and exceedingly healthy. Dr. Fischer also made a journey to the borders of the Galla country.

Herr Marno's Exploration.

Herr Marno, the well-known African traveller, made a journey from Zanzibar into the interior, north of the route pursued by Stanley and Cameron, into what he calls Koa Kiora, where he found a cultivated country, corn and tobacco being raised by the people.

Dr. Junker's Explorations.

Dr. Junker, a Russian-African explorer, has returned to St. Petersburg, after a three-years' journey in northeast Africa. The doctor, during this period, has explored the whole of the watershed between the Upper Welle and the Nile, passing as far as Kalïka to the west of the mountains on the west shore of the Mwutan Nzige (*Albert Nyanza*). He has also gone through the northwest region explored by Schweinfurth, the region of the Mitte Dunka, Bango and Djur, as far as the other side of the Wau river. His exploration was mainly a geographical one, great attention having been given to topographical details. He brought back with him a great amount of material, from which he has constructed a collection of maps of the region traversed, which he is preparing for publication in St. Petersburg. After the publication of

his maps, Dr. Junker intends to go upon another expedition in Africa, taking the most accessible route to Mombutto, which will be the basis of his further explorations. Dr. Junker is exceedingly well qualified for the exploration of this unknown part of Africa, from the knowledge he already possesses of the country, the people, and of their language. He is a man of abundant means, with a well-seasoned constitution, and, what is very important, a favorite with the powerful governor of the Egyptian Soudan.

Outlet of Lake Tanganyika.

It will be remembered that Stanley questioned Cameron's discovery of an outlet to Lake Tanganyika in the river Sukuga, on the west of that lake, founded alike upon Cameron's statement and what Stanley himself saw when he partially explored the Sukuga. This doubt has been set at rest by the fact that in a recent survey of the lake by Mr. Hore, of the London Missionary Society's expedition, the Sukuga was found by him flowing out of Lake Tanganyika, a large and swift river. He reached a point in the river further west than Stanley had gone, and from a high elevation the river was seen by him flowing westward as far as the eye could reach, and in the direction of the Lualaba or Congo, with which the outlet may possibly be connected. When Cameron and Stanley saw the Sukuga it was in the dry season, but when Mr. Hore ascertained what is above stated it was in the wet season, and what was seen by him puts it beyond doubt that the Sukuga river is the outlet of this great lake.

Commander Cameron, at a recent meeting of the Royal Geographical Society, said that the name of Lake Tanganyika was derived from a word meaning to shuffle or mix, and meant the mixing place of waters, a name especially appropriate, for he says that ninety-eight rivers flow into the southern part of the lake, besides springs and torrents.

Belgian Expeditions.

The African International Association inaugurated by his Majesty the King of the Belgians, to which I have previously referred, have despatched four expeditions from the east coast to Lake Tanganyika, one of which had reached there. Mr. Cambier, the leader of the first expedition, had arrived at Karena, on the eastern shore of the lake, and when last heard from was engaged in making arrangements for the establishment of the first station. He has published a sketch map of the route followed by the expedition, and interesting information respecting the natives of an ethnological character was obtained by one of the members—Dr. Dutrieux.

The second expedition, left Bagamoya, on the 2d of June last, where a permanent station is to be established in connection with a station in a bay on Lake Tanganyika to the south of Ujiji, and a further or third station beyond, at Nyangwe on the Congo, or, as it was before called, the Lualaba, the important point from which both Cameron and Stanley started on their final journeys across the African continent. This second Belgian expedition consisted of five Europeans, twenty-five natives and four Indian elephants. The interesting feature in it was the employment of elephants brought from India, which was an experiment, and the success that has attended it shows that a means has been found to facilitate exploration into the interior of Africa, which will greatly overcome the impediments arising from the delays, the desertions, the exactions and other difficulties heretofore experienced from the necessity of employing natives for the carriage of everything upon land in African expeditions. It was found that one elephant would march twenty-seven hours, carrying a load of over one thousand pounds; that these useful and sagacious animals could continue thirty-one hours without eating and forty without drink-

ing, and endure great fatigue; that they were not affected at all by the climate, and were impervious to the attacks of the tetse fly, which has proved so fatal to horses, cattle, and nearly every other kind of animal in Africa. It is impossible to say from the experience gained whether the native African elephant can be effectually trained for this important kind of work, as doubt upon that subject is expressed in a letter written by a member of the expedition, but the African elephant has, in other parts of Africa, when taken young, been trained and rendered exceedingly docile. When I mention the fact that it was found that one elephant would carry as much as fifteen porters, and that, like the camel, it does a great deal in obtaining its own food, it will be at once seen how greatly the use of this animal, independent of many other considerations, will diminish the expense of future expeditions in Africa for exploration and geographical discovery. The last intelligence received is that a fourth Belgian expedition had been despatched from Zanzibar. The plan inaugurated by His Majesty the King of the Belgians, though attended with embarrassment in the beginning, from the death of those sent out to command the expeditions, is a most comprehensive one, as the expeditions from the east coast will be connected with Stanley's expedition up the Congo, establishing a line of stations across the continent, and it promises to be of the greatest benefit for the future of Africa.

Expedition of the London Missionary Society.

The London Missionary Society despatched an expedition under Dr. Southon, which reached Lake Tanganyika, and established a station in Uguha, on the west side of the lake, which is in charge of Messrs. Hutley and Griffith, while Dr. Southon himself is to settle at Urambo, the capital of King Mirambo, in Unyamwezi. The station of the society at Ujiji was placed in charge of Mr. Hoar, the scientific

member of the expedition, whose especial duty it was to survey the lake and report upon places suitable for stations, and it was in the course of this survey that he ascertained what I have before stated in respect to the outlet of the lake. The journey of this expedition from the east coast to Tanganyika was made in one hundred days, the shortest journey previously being that of Stanley, which was two hundred and thirty-six days. The rapidity of the present expedition is attributed to the discrimination with which porters were selected by Dr. Southon, to the careful organization that was maintained, and to propitious weather.

In their journey they passed through the country of Mirambo, with whose name we have become so familiar from the travels of Livingstone and Stanley. They describe it as a beautiful country, inhabited by a simple, pastoral race, who are in no way aggressive, but superstitious, curious and credulous in the extreme. Many of them had intellectual and even classical faces, and the women were frequently pretty and intelligent. Mirambo's capital they describe as a large square enclosure, with a substantial wall, containing full five thousand people. In the open space surrounding the enclosure there are numerous round, well-built huts, containing about ten thousand people, and many villages close to the capital.

Expeditions of the Roman Catholic Mission.

The Archbishop of Algiers, by direction of the Holy See, dispatched an expedition, consisting of sixteen Europeans, for the formation of two great missions in Equatorial Africa; one upon Lake Tanganyika and the other in some position in the vicinity of the lakes Ukerewe and Mwutan Nzige (*Victoria* and *Albert Nyanza*). The expedition reached Ujiji, on Lake Tanganyika, passing through Mpwapwa, of the climate of which they do not give a favorable account. They suffered severely from fevers and the want of proper

food. Although dispatched for religious purposes, the expedition embraced geographical labor, such as determining astronomically the position of places, and they measured the distance from Bagamoyo, on the east coast, to Mpwapwa. From Ujiji, they explored Urunda, a rich region, of which they give a very different account from Stanley. The expedition ultimately reached Uvira, on the northwest extremity of the lake, where it settled. A detachment, as I infer, of this expedition, reached Uganda, on the northwest border of Lake Ukerewe (*Victoria Nyanza*). A second expedition of this organization, which left Algeria last June, with eighteen Europeans, had reached Unanyembi.

The Abbe Debaize's Expedition.

The Abbe Debaize, under the auspices of the French government, conducted an expedition for the exploration of the country south of Lake Mwutan-Nzigi (*Albert Nyanza*) and north of Lake Tanganyika, as well as the mountain regions west of these lakes, and, if possible, as far as the Congo. He reached Ujiji, on Lake Tanganyika, by a different and more northerly route than that taken by any of his predecessors, and had great success in conducting his expedition so far through an unknown country, which he ascribed to moral ascendency, strict discipline, and the measures adopted to keep the expedition in robust health. In a communication made by him, he stated that the power of the Arabs had greatly declined, that the ivory trade no longer supplied their wants, and as they are not allowed to traffic in slaves, that they will ultimately be compelled to abandon this part of Africa to the English, and that this change will be brought about without a shock and almost imperceptibly. He proceeded afterwards from Ujiji to the north of Lake Tanganyika, with unfortunate results. He was twice deserted by his porters, was plundered of a great part of his outfit, returned sick and discouraged to Ujiji, where he died last December.

LAKE NYASSA.

You will remember the important circumstance to which I have heretofore so frequently referred, of the establishment of a permanent missionary station at the southern extremity of Lake Nyassa, called Livingstonia, the introduction of a steamer upon the lake in connection with it, and the confident belief I had that these efforts would tend to the suppression of the internal slave traffic, with all its attendant horrors, which was so rapidly desolating this part of Africa, by the destruction of a people who gave every evidence that they were peculiarly adapted to avail themselves of the advantages of civilization. The successful establishment of Livingstonia has so far justified that conviction, and no work in Africa has so far been attended with more beneficial results, or is more full of promise for the future. Mr. D. S. Stewart, of the Livingstonia station, circumnavigated the lake, being the second survey of it, the object of which was to fix its exact geographical position and examine more particularly the northern part. It was ascertained by this survey that the northeast end of the lake would have to be shifted about thirty miles to the westward. Two harbors were found in the northern part, a very important discovery, as, without harbors, the navigation of this portion of the lake is subject to perils from which it might be difficult to escape. Mr. Stewart and Dr. Laws made an exploration west of the lake with very satisfactory results, in obtaining a knowledge of the country, and in establishing good relations with the people. A further expedition was undertaken for the exploration of the country lying between the north of the lake and the southern end of Lake Tanganyika.

KEITH JOHNSON'S EXPEDITION.

The Royal Geographical Society despatched an expedition to Zanzibar in 1878, under Keith Johnson, son of the

well-known cartographer, and who himself became known from his geographical work in South America. The object of this expedition was the exploration of a direct route from the harbor of Dar-es-Salaam, which is on the East African coast, a few miles south of Zanzibar, to the northern end of Lake Nyassa.

Mr. Joseph Thomson, a geologist, was associated with Mr. Keith Johnson, the object being, not only to construct as complete a map as possible along this new route, a service for which Mr. Johnson was especially fitted, but to gather general geographical, ethnological, geological and other scientific information respecting the region, its products and its inhabitants, and especially to examine the range of mountains seen by the late Captain Elton, at the northeastern end of Lake Nyassa, and then to examine the unknown country lying between Lake Nyassa and the southern end of Lake Tanganyika. The expedition left Zanzibar last May, accompanied by Chulma, Dr. Livingstone's faithful companion, and one hundred and thirty-eight followers. It went up the valley of Lufiji, where their journey was attended by constant rains, and they were hardly ever out of marshes, the result of which was that Mr. Johnson was attacked by dysentery, which has proved fatal to so many African explorers, and after very severe suffering in their toilsome march, he finally succumbed and died at Beho-beho, a village in Kuta, near the Rhua river. Here a pathway was cut through the dense vegetation to a large tree, covered with creepers, which was selected to serve as a monument. A grave was dug at the foot of it, the corpse was enclosed in a kind of basket coffin, and the accomplished young explorer was laid in his final resting-place. His name and the date of his death were cut upon the tree, and a neighboring chief agreed to keep the place clear of vegetation. The command then devolved on Mr. J. Thomson, who, last September, arrived with the expedition

at Mbungo, on the northern end of Lake Nyassa. On approaching the lake, the expedition was unable to discover the Uranga country and river, described by the late Captain Elton. Mr. Thomson believes that the river referred to by Captain Elton was the Mbangala, which flows into the Ruah.

SOUTHEAST AFRICA.

Captain Patterson's Expedition in Matabeli Land.

I have before referred to Matabeli Land. It is a country lying between the Zambesi and the Limpopo rivers, bounded on the east by the river Sabia, and on the west by the Zouga, or Botletle, a river flowing into Lake Ngami, and forms a somewhat irregular square, the length of each side being about four hundred miles, the population of which is estimated at two hundred thousand. Sir Bartle Frere despatched Captain Patterson to obtain accurate information regarding this important country, who, upon his way back, died by drinking, with several of his companions, the waters of a poisoned spring. From his diary, which was brought to Pretoria, it appears that Matabeli Land is ruled by a race of cruel Yula invaders, whose constant occupation is making war in the most savage and ruthless manner, burning towns, driving away cattle, and sparing only children, whom they carry off as slaves, their whole life from childhood upwards being one of bloodshed united with cruel religious rites. The unhappy people subject to them are ruled with a rod of iron, these invaders becoming every year more and more cruel. Their government is solely personal, consisting simply in the will of the chief. Death is inflicted for the slightest offense; any one changing his habits of life, or amassing property, is murdered by the chief's body guard, these murders being of constant occurrence and the only check upon these cruel rulers being the fear of the English

government, which was the reason why Captain Patterson was able to pass through the country with safety. It is from his account a country rich in natural resources, well watered, with a good soil, has a fine climate, trees of great variety and size, and an abundance of iron ore. The missionary Coillard, to whom I have previously referred in connection with Major Pinto's expedition, has been in the country, and, on the contrary, declares that it is very unhealthy.

POPULATION OF AFRICA.

A recent estimate of the population of Africa has been made in England which puts it at 186 millions, being about an average of 16 inhabitants per square mile. The negro regions are the most populous. In the desert regions the population is sparse, but it is very dense in other regions; thus, in the Soudan, it is estimated at 80 millions, or 53 persons to the square mile. The population of East Africa has been estimated at 30 millions, and that of equatorial Africa at 40 millions. The races are divided, in a recent German general estimate of the whole, as follows: Negroes, 130 millions; Hamites, 20 millions; Bantus, 13 millions; Fulas, 8 millions; Nubians, 1½ millions; Hottentots, 50,000, which would make up 172,550,000, somewhat less than the recent English estimate. This is a great increase upon the estimate of a few years ago, of about 60 millions, but our information was then inadequate to form any estimate at all, and the one now made is only conjectural and approximate, and may be too small in respect to some of the races; for the Bantus are here put down at 13 millions, whereas F. M. Muller considers that they constitute at least one-fourth of the population of Africa, and may be 50 millions. The suppression of the entire slave trade, and the influence of European civilization, will undoubtedly lead to an increase in the population, which increase may

be rapid and very great. We cannot, however, hope for many years to have sufficient information to justify an estimate upon which any great reliance can be placed. All attempts at present must be largely founded upon conjectures formed from the loose statements of travellers and several regions, the population of which is certainly great, will probably long escape anything like a thorough examination. The country, however, is undoubtedly very populous. There are, for example, in the regions of the Great Lakes, countries quite as thickly peopled as many of the States of Europe. Stanley tells us of countries of relatively small extent, and which yet possess millions of inhabitants. When we shall have succeeded in getting sufficient reliable information, we may possibly reach a figure as high as the present estimate. In any point of view, however, the enormous populations of this great continent shows what a field it may become in the future under the influence of civilization.

BORNEO.

Herr Carl Boch has made a journey in the centre of Borneo, ascending the Klintjouw river as far as Longwai, thirty miles farther than any civilized man had previously penetrated. He found the Dyaks of the interior more wild and savage than those of the coast, but on the whole partial to the visits of strangers. He discovered, however, a far more interesting race still further removed from civilization, the Orang Poonan, or forest people, who construct no houses, but live in the open forest. They were not dark, but of a fair and yellowish complexion. He describes them as a good and honest people, except that, like all the savages of Borneo, they were given to the practice of cutting off heads; the term head-hunters being applied to many of the savage tribes of Borneo, who have the same natural

propensity for cutting off heads as the North American Indian has for taking a scalp. A rajah with whom he came in contact showed him a collection of the heads of the Dyaks of another tribe, taken, not in open fight, but by treachery while they were asleep.

Settlements have been made by an English asociation, who obtained a large concession in the northern part of Borneo embracing a part of the northeast coast, comprising an area of seventy-eight thousand square miles, and a coast line of five hundred miles, extending from the Kimanis river on the northwest coast to the Sibuco on the east, and having four excellent harbors, one of which is San Dakan bay, a fine sheet of water fifteen miles long and five broad. A great part of the interior is unexplored. The country, as far as known, is everywhere rich and fertile. This association has given to their concession the name of "New Ceylon."

JAVA.

Mr. Charnay, well known as the explorer of Yucatan and Mexico and who is to take charge of the expedition proposed to be dispatched by the French government and Mr. Pierre Lorrillard, of this city, for archæological researches in Central America, explored the east and west portions of the island of Java, and recognized what he regards as a very close resemblance between the great epoch of Buddhist civilization in the Sunda Islands of the Malay Archipelago and that of ancient Mexico. He gives an interesting account of the density of the population of Java; for, although the inhabitants live in the shelter of forests, the population, he says, exceeds in density per square mile the most populous country in Europe.

SUMATRA.

The results of the Dutch expedition to Sumatra, to which I have previously referred, are, that much has been ascertained respecting the heretofore unknown centre of the island. Contrary to the prevailing geographical impression, the Bottang Hari was found to be the largest river. It was ascertained to be two hundred and ten miles in length, in a straight line, and four hundred and ninety miles following its various windings, and is navigable for small vessels drawing three-and-a-half feet of water for three hundred and seventy miles, and for small prahus for four hundred and eighty miles. The population upon it was found to be scanty. Cattle abound in the highlands, and coffee was largely cultivated in Karinchi.

NEW GUINEA.

Mr. A. Goldey cruised along the southeast coast of New Guinea, and found the currents and calms prevailing there a great source of danger. On his way along the coast he discovered a group of islands not heretofore put down on the charts, and two splendid harbors, the finest he had seen in New Guinea, one of which is in Freshwater Bay. He discovered some tribes hitherto unknown, and also a new river on the west side of Cloudy Bay. His exploration appears to have been chiefly along the shores of the Gulf of Papua.

A New Zealand vessel spent some time in Astrolabe Bay, on the northeast coast, and found the natives simple and friendly.

Mr. Rafra explored the northern part of the island, visiting the Arak tribes in Doree and the Peninsula. He states that the natives of the northeast are negroes, but that they differ physically from those of Africa, the nose not being

flat, but aquiline. They are cannibals, and, he says, very coveteous. He passed nearly a year in the country.

Signor Albertis, whose explorations in New Guinea I have so frequently mentioned, has given a general account of the portions of the island visited by him. He states that the mountains and plains of the northeast part of it are clothed with luxuriant forests, to clear which would be a task of great labor; that the land is fertile, but whether the white races can live there is, in his judgment, problematical. The white races, he says, cannot be acclimated on the lowlands, and that the region of the Fly River does not possess any of those large animals that makes Africa so attractive.

All hope of finding rich goldfields in New Guinea appears to have been abandoned. The last of the expeditions that went there in pursuit of mines have returned, worn by privations, fatigue and constant discouragement. These explorations, however, have not been without results, as they have made known a part of the country having great agricultural capabilities, which is peopled by an interesting race, who are thrifty, industrious and kindly, entirely different from what was anticipated.

AUSTRALIA.

There have been several explorations in Australia. Mr. W. H. Cornish examined the country northeast of South Australia for a trigonometrical survey; the chief difficulty encountered being the want of water, notwithstanding which, and the scarcity of food, the natives appeared to thrive.

Mr. Feve made a survey for a railroad from Blockhall, in Queensland, to Port Darwin, in the northern territory of South Australia, encountering few difficulties, save the want of water. Mr. H. Vere Barclay explored in South Australia, between 21° 50′ and 23° 40′ S. lat., and 133° 53′ and

138° E. long., with, however, no very important results, and Mr. W. H. Tietkens has been engaged in surveying the country lying between the south coast and the Musgrave range, some three hundred miles north of the coast, following the route, for the most part, traversed by Mr. Jess Young and himself in 1874.

The chief exploration was under the leadership of Mr. A. Forrest, who has been on several expeditions in Australia during the last ten years. This expedition was from Perth to Port Darwin, along the northwest coast of Australia, its main purpose being to examine the country between the De Gray and the Victoria rivers, between 20° 20′ and 15° S. lat., and 19° and 129° 20′ E. long. It occupied six months. The expedition travelled about four hundred miles to Beagle Bay, discovering a large tract of country suitable for sheep and cattle; from thence they went to King's Sound, and followed it to Fitzroy River, which is described as a noble stream, teaming with fish and navigable with small steamers for one hundred miles inward, the whole country abounding in emus and kangaroos. The river basin Mr. Forrest estimated as containing five millions of acres adapted for pasture lands. From thence they went northwest to Collier Bay, and attempted, after great trials and difficulties, to reach the Glenelg River, but, after toiling one hundred and forty miles, had to abandon the attempt to get further north. I have not space to follow their route, except to state that, in making their way to the Victoria River, they discovered millions of acres interspersed with large rivers running northwest; that they met large numbers of natives who had never seen a white man, and were unmolested by them, but they never met a woman. In the subsequent stages of their journey their trials were very great, the blazing heat of the tropical sun drying up their store of water in a waterless country, where they suffered terribly from thirst. They pushed on, however,

and were resolute amid terrible sufferings, the tongue of each man being so swelled that it nearly choked him and rendered all of them speechless, and they would probably have perished had they not met a party, by whom they were rescued, and brought to what is known as the Catherine Telegraph Station. The result of this journey, attended with so much suffering, is the important discovery of about twenty millions of acres of valuable pastoral land.

CONCLUSION.

This enumeration of what has been done during the last two years, though given in a very general way (for it is impossible in such an address to go much into details), is sufficient to show that we are living in a great geographical age. The fact that I have here referred to *twenty-one* distinct explorations, during this short period, into unknown or imperfectly known parts on the continent of America, North and South—*thirty-two* in Africa and *thirty-eight* in Asia—which have either been organized expeditions or journeys of individual travellers for the purpose of exploration and discovery, shows a determination by the civilized nations of the earth that every part of it accessible to man shall be thoroughly explored. It may, in conclusion, be confidently said that the work now going on will not stop unless arrested by a general war or some great convulsion of society; and that the close of the nineteenth century, remarkable as it has been in other respects, will, in this feature alone, take rank hereafter as one of the great epochs of mankind.

APPENDIX.

Letter of Lieut. Frederick Schwatka, U. S. Army, Commanding Franklin Search Party.

Camp Daly, North Hudson Bay,
March 31*st*, 1879.

Chief Justice Daly,
President American Geographical Society.

Dear Sir: I take advantage of the return of the American whaler *Isabella*, Captain Garvin, of New Bedford, now wintering at Marble Island, to give you a brief description of the present status of the Franklin Search Party.

Last fall, upon entering Hudson bay, I found the greater portion of the Esquimaux located near Depot island, and this fact, dependent as I was upon them for dogs, guides, and further confirmation of the story upon which the expedition was based, forced me to locate my party of white men also here, as there was no time to attend to all this business in a few days—one or two—all which Captain Barry could spare from whaling, and then transfer to Repulse bay, which point I should have very much preferred as being so much nearer my objective point, be it the Gulf of Boothia or King Williams' Land.

During the fall of 1878, I surveyed the coast of North Hudson bay as well as the protracted bad weather would permit, and I enclose you a rough chart, showing the result of my limited labor. The value of this will become apparent if you will take the trouble to compare it with the latest Admiralty charts of this section of the country. Marble island, in whose harbor American whalers annually winter, is nearly 2 degrees of longitude too far to the westward, and the adjacent shore proportionally incorrect. I do not understand this, as in Bowditch the longitude is nearly correct. The continuous bad weather last fall, the worst which Captain Fisher has seen in fourteen years' continuous whaling in this bay, prevented me from having more to show in the way of explorations. In Sep-

tember I was cast away on an island, where I was compelled to remain three days without food, the whaler *A. J. Ross* being wrecked fifty miles eastward in Rowe's Welcome. In regard to the Nachillas, I found out that there had been three families of them that had been living among the Iwillees, or Hudson bay natives. These families had come since the departure of Captain Hall in 1868, which accounts for his silence in regard to this band. The head of one of these families, an aged paralytic called by the whalers "Monkey," had died the season previous to my arrival. One other, called "Ik-kee-sik," is a young man who left the Nachilla country when quite young and knows of the Franklin story only by hearsay. He belonged to my party, and as I have placed him in possession of a gun, ammunition, etc., which he never had before, he seems much attached to the Kodlunahs or white men, and will, I think, prove faithful. The other Nachilla is about 40 years of age, probably older. In the latter part of January I had a long and satisfactory conversation with him regarding the knowledge possessed by the Nachillas of Franklin's party. "Nu-tok-ee-ak," such is his name, gave me much information, mostly corroborative of that obtained by McClintock, Rae and Hall, but some of it was new and important. His father had found a stone cavern on the south side of King William's Land, which he had opened, and found concealed therein a small tin box containing a piece of paper on which there was writing. He did not know on which part of the south of the island the cairn had been found or what had since become of the paper. When a young man, he had visited South King William's Land, and there was shown a despoiled cairn, which had been erected by the retreating white men on a very large flat stone, this bearing the appearance of having been dragged to this spot, as it rested on a sandy tract some distance from a rocky ledge. This cairn the Nachillas had previously torn down, nothing being found therein, and had endeavored, at many different times, unavailingly, however (as their parties were always small), to dislodge the large stone. Nu-tok-ee-ak with a companion tried to overturn it once, but was also unsuccessful. He believes, as do all the Nachillas with whom he has talked, that nothing being found in the upper cairn, that something is buried under it. Asking him to point out the site on the map, he placed the pencil point on the coast on the north side of Washington bay, about ten or fifteen miles northwest of Cape Herschel. Ik-kee-sik, my Nachilla guide, knows the site of

this stone, he having seen it when a small boy, and says that we will have no trouble in finding it again, as he claims he will be able to go directly to it. Nu-tok-ee-ak appears to me to be very accurate in his knowledge of geographical positions. When asked to locate the three boats he was describing to me, and which are no doubt the same alluded to by McClintock and Hall, he placed the pencil point within five or six miles of the spot as described by these officers. Without asking for such information, he told me that there was an immense cairn on Cape Herschel, erected many years ago by white men, and the Admiralty charts show such a cairn to be erected by Ross at that point in 1839. The Nachillas visit the southern shore of King William's Land only during the time that sledging is practicable, when there is plenty of snow upon the ground. During July and August, when the snow is gone, it is entirely deserted. They very seldom visit the western coast. He further speaks of a boat that some Nachillas found on the peninsula somewhere between the mouth of Back's river and Barrow inlet, on the southern coast of Simpson strait. He had never heard of any cairn or cache made by the white men being found opened by natives and articles abstrated, with the single exception of that one despoiled by his father. The many Franklin relics obtained by previous search parties and Arctic voyagers from the Esquimaux have all been found at the tent and boats described by Hall and McClintock, or near the many skeletons which are strewn along the southern coast of King William's Land. There are many more skeletons than Hall and McClintock saw, or even heard of. So many were not lost upon the ice as Hall supposed, but are buried beneath the deep snows in the Spring, the only time in which search parties have traversed these parts. Nu-tok-ee-ak cannot fix even approximately any number, but says expressively that there are many more than the Nachillas can count. He says that none of the white men ever passed through the Nachilla country, lying southeast of King William's Land, on the adjacent mainland, which they would be compelled to do to reach Repulse bay, or any portion of the Gulf of Boothia. Neither he, nor any of the other natives here, know or have ever heard of any cairn made in the latter place. The Nachillas, in fact, never visit this country. From all the information which I can obtain here, I find it utterly impossible to confirm, even in part, the story on which the present Franklin Search Party is based. In fact, I am thoroughly convinced there is nothing

whatsoever in it. Officers of whalers here, who have had many more advantages, and were with Captain Barry at the time, know nothing of his information. My expedition, therefore, if anything can be accomplished, must look to King William's Land and the opposite mainland, especially along Back's river, as its theatre of operations, having the advantage over previous search parties of a summer's survey when the snow is gone—an advantage which a short sojourn in this Arctic country would soon convince any person cannot be overrated.

I start to-morrow on my sledge journey to King William's Land, having four white men and twelve Innuits, with three heavy sledges of fifteen dogs each, and one light one of six or seven dogs. The distance to Cape Felix, the furthest point which I desire to reach, is about four hundred and fifty miles, two hundred of which, to the nearest point on Back's river, has never been trod by previous explorers. Of this two hundred miles, I have made a preliminary survey of about one hundred (across land to the head of Wager river), leaving only about one hundred which can be sufficiently rough to hinder the progress of the party. From the general character of the country I fear no such misfortune, and Joe believes we have got a better route than that pursued by Hall. I shall return when the autumn snows make sledging practicable, and if I find an American whaler wintering here, will return in her, in the fall of 1880. Should there be none, I shall transfer my party and material to either Forts York or Churchill, the most northern posts of the Hudson Bay Company, some fourhundred miles to the south, and return to England in their ship.

With these brief statements I close, and hope and believe that something will be done by my party to justify the expectations of the contributors who fitted out the expedition. I know that some little knowledge will be added to Arctic geography, and from the many points in King William's Land which now offer so many inducements, I hope to find something.

I am, dear sir,

Very respectfully,

Your obedient servant,

FREDERICK SCHWATKA,

Commanding Search Party.

THE "BAD LANDS" OF WYOMING AND THEIR FOSSIL REMAINS.

BY

JOHN B. M'MASTER, C.E., PRINCETON COLLEGE.

Macaulay has observed that the dexterous Capuchins never choose to preach on the life and miracles of a saint till they have awakened the devotional feelings of their auditors by exhibiting some relic of him—a thread of his garment, a lock of his hair, a drop of his blood. On the same principle, I would gladly prepare what I have to say this evening with an exhibition of some relic of the departed, for I, too, like the Capuchins, am to speak of a race of beings long since passed away. But I have no relic, no lock of hair, no drop of blood, not even a fragment of bone, to show in hope of awakening your interest and so securing a patient hearing.

Bones, indeed, are not wanting; yet the absence of them on this particular occasion is scarcely to be deplored, as there are few things which at first sight seem so ill-fitted to awaken interest as an old fossil. I am sure that to nine-tenths of the people who wander among the cases of a geological museum, a femur from the tertiary, or half a dozen vertebræ from the cretaceous, are just about as interesting as boomerangs from Australia or a carved idol from Japan. They are simply curiosities, something to be talked about for a few minutes and then forgotten, and of no earthly use whatever, unless it be as pretexts for a number of very learned gentlemen to meet once every year at some fashionable watering-place, to enjoy the festivities and read long papers on geology. But in truth they have always been more interesting than we are apt to think; and when the history of civilization comes to be written, as it is to be hoped some day it will be, the strangest chapter of all will be the narrative of the influence which fossil bones have exerted over the human mind at every stage of the long march from igno-

rance and barbarism to the highest degree of knowledge and refinement. That influence is distinctly traceable in the myths, in the legends, in the folk-lore, in the superstitions of every race of men of whom we possess any accurate information whatever. Nay, more, the grotesque monsters that figure so prominently in heraldry, and who, as they sit guard over lovely princesses and great stores of gold and jewels, are constantly being combated by the heroes of nursery tales, owe their existence to the finding of a few old bones, ages ago, by an ignorant people.

Honest Herodotus, whose wildest stories are every day being more and more fully verified, furnishes us with an illustration of this, quite to the point, in his account of the griffin. He assures us that griffins were common in Scythia, that they possessed the gold mines there, and that the Aramaspians fought with them, slew them, and took away the gold, and that if any one were so incredulous as to doubt this, the Scythians could show him the bones of the griffins they had killed. For a long time this story was thought to be quite on a par with that of the lake-dwellers, and another instance of the exceeding gullibility of the "Father of History." But a geological survey of the region where the Aramaspians lived was made a few years since, and then the truth came out fast. There, sure enough, were the gold bearing strata, and just above them a layer rich in bones of enormous animals that became extinct long before the human race began to exist. These bones the Scythians found in their search for gold. They seemed to be the remains of animals that had once watched and brooded over the gold, and from this the Aramaspians made their story of the griffin, and used it to terrify their neighbors and keep them from disturbing the mines.

Nor is this by any means an isolated instance. In Siberia precisely the same thing occurred, and there gave rise to the story of a great bird, as conclusive evidence of the existence of which a quantity of ivory claws some three and some four feet long are shown. But the claws so triumphantly exhibited are, in reality, the tusks of a creature whose official title is *Rhinoceros tichorlimus*, an animal of great size, which, in pre-glacial days, wandered over Europe from one end to the other. Indeed, the tusks of this beast always have

been, and still are, dug up on the continent. In the middle ages they were regarded as the claws of the griffin. Sometimes drinking-horns were made of them, and sometimes, mounted in gold and silver setting, they were preserved in churches and libraries as relics of great price. Gerard Leigh, a famous herald of Elizabeth's day, had one of them, and says of griffins: "I think they are of great hugeness, for I have a claw of one of their paws which should show them to be as big as two lions." Mary of Hungary had another; a third was long preserved in Catton's Library; a fourth was in the collection of the Royal Society; and down to a very few years ago one might have been seen in Corpus Christi College, at Oxford, so mounted on little gilt claws as to leave no doubt as to what it was thought to be.

While from the tusks of the rhinoceros were thus made griffins, from the bones of mastodons and elephants were made giants. The writings of early naturalists and historians are full of instances of the discovery of giant remains. Boccaccio makes mention of the bones of a giant dug up near Trapani, in Sicily. The moment they were exposed to the air they crumbled into dust, but happily, he says, three-tenths were preserved, which weighed an hundred ounces, and were so large that a hundred teeth of ordinary mortals could easily have been made of them. These tusks, which were those of an elephant, the men of Drapani long preserved in their church. They were agreed that the former possessor must have been a man at least 200 cubits high, but they could not agree as to his name. Some said he was Eric, and some Etbellus, and others a Cyclops, even that particular Cyclops into whose single eye Ulysses thrust the scorched mast. The skull and shoulder blade, six cubits broad, of Briatus, was dug up in 1456. Fifty years later, while some workmen were digging in the trenches at Roeven, they came upon the remains of a giant whose skull held a bushel of corn and whose shin bones reached to the girdle of the tallest man among them. But before this a most memorable heap of bones was found at Reyden, and celebrated in song by Felix Plater, the renowned physician of Basle. The bones, reputed there to belong to a giant 16 feet high, have long since been consigned to a remote department of zoology. But such is the tenacity of human credulity that the

giant still holds his place in the popular belief and his standing-ground beside the arms of Lucerne, and he is likely to hold them for many a day yet to come.

At the time of the conquest of Mexico, Bernal Diaz was told by the natives of the great size and deeds of the giant that once dwelt in the country. The stories were too absurd for even so credulous an historian as Diaz to believe, till, in proof of them, the natives brought him the leg bone of one of them. This he measured against himself and found it to be as tall as he, and he was, he assures us, a man of reasonable height. But there are instances of later date. In 1712, we find Dr. Mather presenting the Royal Society with a very learned paper on the bones of a giant dug up at Claverack, on the Hudson. It is needless to say they were the bones of a mastodon. And to-day, over the whole area of the Pampas, which is indeed a vast sepulchre of extinct animal remains, the names "Hill of the Giants," "Field of the Giants," are, travelers tell us, an unerring guide to the geologist in his search for bones.

It is not worth while to follow this further. Enough has been said, I am sure, to illustrate at least one of many ways in which fossil bones have influenced human thought. Yet there is one other opinion resulting from all this which must not be passed by in silence. From the belief that "there were giants in those days," to the belief that all men were in early times taller than they now are, there is but one step, and that is soon taken. No man in his senses now thinks that there ever was such a thing as a man twenty feet high. The mere statement of such a thing would raise a jeer in any well regulated nursery. But there are very many men who sincerely believe that our race has sadly degenerated; that at some time, now far in the past, men were stronger, bolder, of a more lofty size; that the Gauls and Britons Cæsar conquered were taller by a hand's breadth than the present inhabitants of Paris and London; that the Praetorians of Augusta were of greater height than the Grenadiers of Frederick. Much has been said in behalf of this idle theory, which was never so fully stated as by Henrion. The huge bones so often brought to light had sorely puzzled him. He could not bring himself to accept an occasional giant. He affirmed that since the day of creation the human race had steadily degenerated

in size, so steadily, indeed, that he made out a table of the height of the great men of antiquity. Adam, said he, was 123 feet high, Eve 118, Noah 98, Abraham 28, Moses 13, Hercules 10, Alexander 6, Cæsar 5, and had not God in his infinite mercy there staid the decline, men would in his time 1718 have degenerated into atoms. It seems scarcely credible that such are the deliberate statements of a French Academician.

The day, however, for such reasoning has gone by. The labors of comparative anatomists have made it impossible for the veriest schoolboy to mistake, as Buffon did, the bones of an elephant for those of a man. The fossil remains which troubled the men of our earlier time—the skulls holding a bushel of corn, the teeth from which an hundred human teeth could easily have been made, the shin-bones reaching up to the girdle of the tallest man among them—have all been discovered to be quite unlike the bones of man. There is no longer any doubt that they are the remains of animals, and with them have been constructed creatures whose names are not to be found in any of the writings of Cuvier, of Buffon, of Audibon. To such an extent has this been carried, that when to the labors of the anatomist are added the labors of botanist and geologist, sufficient material is at hand for a fair description of the physical geography of the earth in past ages. Not only is it possible to mark down on the map with much accuracy the margins of seas and lakes dried up nobody knows how long ago, but it is also possible to speak with absolute certainty of the reptiles that swarmed in those waters, of the plants and trees that covered the land, of the animals that wandered among the hills and forests.

Now, it seems to me that this is a branch of geography not to be despised. It seems to me that it is quite as interesting and almost as useful to know something of the physical features of the earth, and of the geographical distribution of plants and animals, in times past as in times present, and that our stock of knowledge is just as likely to be increased by a study of the rocks as by the discovery of the north polar sea or the exploration of the heart of Africa. Commerce will not be extended, trade will not be improved, wealth will not be increased one penny by the discovery of the north-west passage, or by the announcement of the fact that in the heart

of Africa are mountains and rivers and great seas. Yet this is no reason whatever why those regions should not be explored, nor does it take away one jot from our admiration of the courage, the patient endurance, the indomitable will of the little band of men to whom we owe every bit of information we possess concerning those spots. Precisely the same thing is true of the geography of the past world. It will not add to our prosperity as a nation to know that the great plains of the West, where are now some of our richest States, were once the bed of a sea, and that when the waters had gone down the dry land was covered with a flora and inhabited by a fauna every trace of which is buried up under a thousand feet of rock. Yet that is no reason why the fact should not be ascertained with the utmost fullness of detail.

Thinking this way, I would ask your indulgence for a few minutes this evening while I depart from the usage of the Society, and speak of the geography of a part of a past world. I shall endeavor to set before you a picture of our West in that age to which geologists have given the name cretaceous. I shall attempt to give some account of the physical features of the country and of its climate, and to describe, as best I may, the plants and trees which grew upon the land, and the reptiles and mammals which inhabited the seas and forests, long before the mountains of California were thrown up, before the Gulf States had arisen from the sea, and while the green marl beds of New Jersey and the white cliffs of Dover were still in the process of making.

Such a description, composed from the scanty materials of a geological cabinet, fossil bones and skulls, fossil leaves and fishes, rock-sections and notes taken in the field, must of necessity be very imperfect. Yet it will not have been made in vain if it affords even an imperfect idea of a world that passed away nobody knows how many thousands of years ago, and whose plants and animals are now found buried up under a thousand feet of rock. Wyoming has been selected from among all the territories because of its exceeding richness in fossil remains, and because much of the evidence to be presented has been there collected by two expeditions sent out under the auspices of the geological museum at Princeton.

But it may not be amiss to preface our description of the ancient

geography of that territory with a brief sketch of its present geographical features, and of the evidence, and the manner of collecting the evidence, on which our account of its ancient geography is based.

Wyoming lies almost midway between the valley of the Mississippi and the Pacific, on that great plateau from whose surface rise the innumerable ridges and foot-hills which, taken together, make up the Rocky mountains. The plateau, often called the "Great American desert," is, to the eye, as level as the floor, but in reality has a steady upward slope from the Mississippi to the Rockies. An idea of this gradual slope may be had from the profile of the Union Pacific Railroad. At Chicago the elevation above the sea is some 600 feet. At Omaha, 494 miles west, the elevation is 966 feet. At Cheyenne, 1,010 miles from Chicago, the plateau has risen to 6,041 feet. From Cheyenne the ascent is more rapid, till at Sherman, 33 miles west of Cheyenne, it reaches 8,242 feet. Thence the slope is steadily downwards to the Pacific. Wyoming lies on each of these slopes, with a mean elevation of 7,000 feet above the sea. In the extreme northwest corner is the Yellowstone National Park. To the south, and extending to the middle of the territory, is a succession of mountain ridges and high plateaus. Beyond these spread out the great plains, connecting with those of the Missouri on the east, and forming a pass more than 140 miles wide over the Rocky mountains.

During the cretaceous age, these plains lay at the bottom of a great sea. The waters of innumerable rivers, flowing over the land, eroding and wearing away the rocks and earth, fed the sea and brought to its shores great quantities of detritus. This the currents took up, and, conveying it far from the shore, deposited it in those vast beds of sand, of gravel and of mud which now make the rocks and soil of the plains.

So distinctly are the cretaceous rocks marked off from those of an earlier and a later time, that the boundaries of the sea on whose bed they were deposited have been almost as accurately defined as the boundaries of many of the territories it once covered. The shoreline on the east extended from about the middle of Arkansas northwestward to near Fort Riley on the Kansas river, ran thence to

Omaha and, sweeping off to the northeast, passed into the British possessions not far from the head of Lake Superior. To the west the extent of the sea was vast, but the western shore is probably now buried under the waters of the North Pacific ocean. But, as time went on, this sea-bottom was slowly elevated, the water grew shallower and shallower, the surface grew more and more contracted, till at last the sea was completely enclosed on the west and opened into the Pacific and Atlantic at the Gulf of Mexico and the Arctic sea. The gradual elevation of the land continuing, the area of the water grew smaller and smaller, and as ridge after ridge of the sea-bottom came to the surface, low bars were formed, which cut off large areas and turned them into fresh water lakes. The whole region once submerged by the cretaceous sea was thus, at the close of that age, spotted with innumerable lakes and ponds.

One such fresh water lake covered the whole southern plateau of Wyoming from the Mintah mountains in Utah on the south to the Wahsatch mountains on the west, and the Wind river mountains on the east. Its waters teemed with life; along its shores grew a rich tropical vegetation, which furnished food to animals as numerous and varied as those of any other fauna, recent or extinct, in any part of the world. But all this was doomed to destruction. The land continued to rise, and the great Mintah lake was emptied, apparently in successive portions and after long intervals, till finally it was drained to the very bottom. What had for so many ages been the bed, first of a great salt sea, and then of a fresh water lake, became the dry land, and the ancient lake deposits now form the surface of the country and appear as an extensive plain.

Unlike the sedimentary deposits at other places and of other times, those of Wyoming have never been pressed into hard rocks beneath piles of later sediment. They have not been roasted and crystallized by internal heat. They yield readily to the action of water, which has eroded them on a most extensive scale. Indeed, there is scarcely an inch of territory which is not now far below its ancient level. From the surface of the plains rise in every direction, sometimes isolated, sometimes in groups, sometimes in long lines like an immense earthwork, flat-topped hills and tablelands, which serve as imperfect gauges of the ancient level. Yet, high as they are, their

summits have not escaped erosion, and even those whose vertical sides rise four hundred, five hundred, perhaps seven hundred feet above the plains at their base, bear distinct evidence of diminished height. The name "butte" is given to these tablelands, or benches, especially when they are of limited extent. The plains around them, too, are strewn with heaps of gravel mingled with chips of water-rolled flints and pebbles, and are cut into channels and deep ravines by the streams which each spring run down from the melting snow of the mountain. On every hand the country resembles an immense excavation, made ages ago by some extinct race of men, and not yet smoothed and worn by time and covered with grass.

Of vegetation there is scarcely any. Along the very edges of the streams grow stunted cottonwood trees and willows. The valleys, if overflowed in the spring, produce sedge, coarse grass and rushes. The bottoms of the hills and narrow valleys, into which the sunlight rarely comes, support a growth of aspen trees, but the plains are in general utterly barren. Not a tree or a bush is anywhere to be seen; nothing is visible but the dull gray level, broken here and there by patches of gravel or clusters of sage-brush and gnease-wood. The foot-hills are thickly covered with forests of pine and quaking-asps, and the great mountains form a broad belt of pines and firs, from which rise their rocky summits, as bare of vegetation as the wide plains at their base.

But their sterility is the least objectionable feature of the plains. The heat and dryness is intense. The moment the first rays of the morning sun are felt, the mercury begins to rise, and long before noon it has gone above 100 degrees. By noon it has touched 122 or 123 degrees. Then the gray alkali dust becomes so hot that you cannot bear your hand upon it, and the air dances before your eyes like the heated gases from a chimney. The glare from the earth is almost blinding. Towards the middle of the afternoon a breeze springs up, and speedily increases to a strong wind, intensely hot and dry, which blows the dust in great clouds over the plains. This continues till the sun goes down and the mercury sinks with it. For an hour or two after sunset, as the air grows cooler and cooler, the mosquitoes come forth and make life miserable. From them there is, indeed, but one refuge, and that is almost as trying to the temper

as their stings—the rank smoke of a sage-brush fire. Scarcely a night passes during the hot months but the traveler is forced to pile these pungent boughs on the fire, shut his eyes and lie down in the smoke. Fortunately, however, this visitation if not of long duration. In less than three hours after the sun has disappeared behind the edges of the plains, the thermometer has fallen below 50 and frozen the mosquitoes out. Before midnight it is under 32, and ice forms in the camp-kettles. Many times during our trip the range of the thermometer in the space of 24 hours was through 91 degrees.

The attention of geologists was first attracted to this region by the stories and the relics brought home by the early explorers, who, in the days of the gold fever, when the plateau of southern Wyoming was a highway for countless caravans, went out from the settlements beyond the Mississippi to explore the wilderness and lay out new roads. Few, indeed, among them were tempted by their zeal for discovery to depart far from the green pastures and cool springs of the river-bottoms, or to push their way over alkali plains to the "bad lands." Yet of those who did, scarcely one but could tell of warm springs and steaming pools of water, so hot you could not bear your hand in them; hard by, other pools, in which the mercury fell below forty; of geysers, spouting mud and stones; of trap-dykes running across the country for miles like a huge fence; of eroded valleys, bounded by steep bluffs, whose faces were marked with layers of brown and green and pink sandstone. They were never weary of telling of journeys across great plateaux, where, for weeks, not a tree nor a bush was seen, and where on a sudden the traveler found himself on the edge of a great bluff, while below him, stretching away as far as the eye could reach, lay an endless succession of columns and pyramids, capped with great boulders, and of buttes between which wound deep and narrow cañons, like the crooked lanes of a city. The explorer who was bold enough to clamber down the steep sides of the bluff and take his way along the beds of the narrow streams, climbing over loose boulders and crawling under projecting ledges, rarely failed to come back to his companions loaded down with fossils. Sometimes they were the teeth and scales of fishes, or the plastron of a turtle, or

the jaws of a crocodile; sometimes bits of ribs, leg-bones and teeth of monsters that became extinct while a third of our continent was submerged in the sea.

The "bad lands" are famous spots for fossils. The whole territory, in truth, from one end to the other, may be said to be a great cemetery of extinct animal remains. You cannot climb up the sides of a butte, you cannot examine in the most careless way the face of any terrace, but you will find the fragmentary remains of animal life. Every outcrop of shale is full of fossil grass, or leaves, or fish. Scarcely a bed of sandstone but is loaded with bones or fresh-water shells. But nowhere are fossils so abundant as in the "bad lands." These *mauvaise terres*, as they are labelled on the maps, require perhaps a word of description. The character of the rocks, almost exclusively sandstone and shale, clearly indicate that the sand and mud comprising them was deposited by water; that Wyoming, in short, was once the bed of a vast sea; that the sea bottom underwent a gradual elevation; that, the higher portions appearing above the water much sooner than the lower, the sea was cut up into innumerable lakes; and that, the land still continuing to rise, the lakes were in time drained and their beds made dry land. No sooner was this completed than erosion began, and the great deposits of detritus began to be worn away, till finally the country was brought to its present state. To the traveler now journeying over Wyoming, the features of the land are high mountains, broad and level plains, buttes, terraces and table-lands.

The name "butte" has lost much of the meaning of the French word, and is applied to almost every isolated mound, great or small, which rises abruptly from the plain. They cannot be likened to hills, as we understand the word, for that dome-shaped, undulating outline is utterly wanting. They are but the remains, the landmarks, if I may so speak, of the ancient level of the country which the eroding waters have spared, and bear all the sharpness of outline so characteristic of erosion by water. In many of them the sides rise vertically from the plain for 400 or 500 feet, and end at the summit in a broad plane as level as the floor. The sides of others, which have not been capped and protected by layers of sandstone, are weathered and cut into all manner of fantastic shapes,

greatly enhanced by the color of the strata, some green, some white, some yellow and some dark brown. One of the finest specimens of a butte in all Wyoming is, I believe, Church butte. In length, it is not over 700 feet, with a width across the base of perhaps 300 feet, and a height of 170 feet, but standing alone in the midst of a wide and level plain is distinctly visible for miles in every direction, and be seen from the railroad. Seen from a distance, it has to the good people of Wyoming some likeness to a church, and they have from this fact so named it. To a "tender-foot," as a man fresh from the East is irreverently named, the likeness seems far-fetched, and is only excusable on the ground that the men of Wyoming do not know what a church is. Outside of what there pass for great cities, Cheyenne, Green River and the like, such a thing as a church is never seen, nor does it seem too much to say that all the churches in the territory might be counted on the fingers of both hands.

However this may be, Church butte has its name, and is a great pile of strangely weathered sandstone. The beds are of varying thickness and toughness. The thick one at the bottom is a pale green, and weathers into peaks and small spires. Over this comes a layer of some fine but thick, of course, brown standstone, and withstanding the effects of weather so well that it overhangs the more easily weathered standstone beneath it, projecting in shelves and ledges till, unable longer to support its own weight, huge slabs break off and form heaps of debris at the base.

Of the terraced or bench-land formation, a most excellent example is that immediately behind Green River City. The beds are there of the cretaceous formation, and entirely of shale. That is to say, they are composed of the mud deposited by the still water of an ancient lake. Precisely how thick this deposit may be below the surface cannot of course be ascertained, but above the level of the plane it rises 1,200 feet, and shows unmistakable evidence of the present top being greatly below the ancient summit. This height, it is needless to say, is not made in one clear rise, but in several benches or terraces. The lowest bench runs close along the bed of Green river, and may, not unjustly, be likened to the Palisades. At the foot of bench lie heaps of crumbled shale, out of which the bluff rises almost perfectly vertically for over 400 feet.

The strata comprising it lie in thick horizontal bands, some of them cream color, some pale yellow, some buff and then shading off to a brick color. Above this, and sloping back at so great an angle as the nature of the crumbled shale will allow, is a second immense pile of debris, out of which rises a second bench, as high but not so regular as the first. In the gaps of this bench fragments of the old broken-down bluff still remain — huge rectangular masses coming out of mounds of broken shale, like tall chimneys or monumental columns. One such mass, known as Chimney rock, stands just behind the Town Hall at Green River City, on the summit of a steep hill, made up of fine-grained earth, which once composed the shale. To a spectator standing on the railroad platform, Chimney rock seems to be not more than 50 feet high. But the measured height of its top above its base is 180 feet—so difficult is it in this region of "magnificent distances" to form a true idea of altitudes.

As might be expected, these Green river beds are rich in fossils. One of the finest fish-deposits in the world is the railroad cutting some three miles out of the city, and I have myself, while riding along the river edge at the foot of the bluffs, pried out here and there with my sheath knife large flakes of shale, and invariably found in them water grasses, leaves, or fragments of a fish.

Impressive as are such scenes of magnificent desolation, they are not to be compared to the scenes in the bad lands which are scattered over the southern portion of the Territory. It fell to the fortune of the members of the Princeton party to pass a month in one of these spots. The expedition started early in June from Fort Bridger, an old fort built in the southwestern corner of Wyoming, to overawe the Mormons in the days when a Mormon differed from an Indian only in color. It came direct to Green River City, turned to the south, and after three days' riding entered the bad lands. This ride, despite the long journeys, often extended from sunrise till long after midnight, in search of water, was quite a pleasant one, as the trail wound along the beds of deep cañons, among beautifully wooded buttes and valleys, and over two mountains whose flat tops were more than 9,000 feet above the sea.

The ascent of the first of these, known as Aspen mountain, was

literally through a garden of flowers. The snow was not yet gone, and the earth, soaked with water from the melting drifts, supported a luxurious growth of those delicate flowers, which seem to flourish only at such altitudes. The brilliant colors, blue, yellow and crimsom, of the flowers, stood in marked contrast with the long patches and ridges of snow. Far to the south of Aspen mountain rose a second, known as Pine bluffs, and some twenty miles beyond this lay the bad lands. They were entirely below the level of the plain, so that one literally stood on the edge of a precipice before the least trace of the excavations below him became visible. But what was then seen defies description. The eroded area was in three immense basins, each smaller and lower than the other, so that, standing at the edge of the plain and looking downward, the bad lands presented the appearance of an amphitheatre, of which the bed of the lowest basin, stretching away till it disappeared in the distance, was the arena, and the two benches separating the first and second and the second and third basins were the tiers of seats. From the plane to the bottom of the first basin the walls were so steep that only here and there a descent could be made, yet very irregular and broken, sometimes jutting out in long thin masses, again scolloped into deep recesses or broken through by narrow cañons that wound and twisted, crossed, and recrossed, and finally terminating in one cañon which led into a cup-shaped excavation. In such places the sides were almost perfectly vertical, 150 or 160 feet high, and made up of brightly colored beds of sandstone. Usually the lowest bed was pale green, which under the action of the sun weathered pink. Over this was a thick bed of green sandstone, then a lighter green layer, all streaked with dark green clay, the whole capped with a stratum of dark brown. Above this the bands of color were repeated over and over again to the top. On the floor of these walls were to be seen every conceivable form of erosion, pyramids, cones, mounds, and table-like platforms, which here and there stood up, isolated or in clusters of two or three tall needles of sandstone, each capped by a boulder of hard brown sandstone, to whose protection they owed existence. Out from the walls and scattered over the floors of the basins stood small buttes, some with steep vertical sides and broad tops, others with sides broken by benches and ending hundreds of

feet above them bases in sharp edge not two feet wide. But, like Melrose Abbey, the bad lands to be seen in all their splendor must be visited "in the pale moonlight." The glittering whiteness of the rocks, the deep black shadows cast by every projecting ledge, the faces of the walls weathered into caves and hollows of the strangest and most fantastic shapes, the huge boulders piled one upon another, or standing out alone in the bright moonlight and casting curiously shaped shadows, all combine to produce an effect unequalled by any of the drawings of Doré.

The chief attraction of the bad lands for the geologist is not, however, the scenery, but the fossils; for there, buried in the rocks, are the remains of multitudes of animals forever extinct. If the explorer search along the bottom of the rain-washes and ravines he will often come upon the fragment of a bone, and will generally find beyond it other fragments, and still others, forming a long line of bone chips, which lead him to some elevated position on the bank, where lies, half buried in the rock, parts of the skeleton of a monster of the ancient world. He may perhaps find a jaw, or an entire skull, or some rib-bones or vertebræ, all of them badly flattened if not broken by the weight of the mass of sandstone above them, thus indicating that they were buried while in a tender state. An entire sketeton, indeed the greater part of a skeleton, is never found, for the bones have almost in every case been buried in the beds of great lakes or seas, and the bones in all probability drifted hither and thither over the bottom by the currents.

Could we, by some magical process, be carried back this evening into Kansas or Wyoming, and placed on the shore of its cretaceous sea, we should feel ourselves in a world completely new to us. The whole features of the land would be changed. Around us on every hand would be plants and animals of a kind now found nowhere out of the tropics, and with them would be others utterly unlike any creature now existing.

Far out on the expanse of waters, for example, would perhaps be seen a snake-like form rising erect with tapering throat and arrow-shaped head, twenty feet above the water. This extraordinary neck, for neck it was, rose from a body of elephantine proportions, and was balanced behind by a tail of the serpent pattern. The limbs

were probably two pair of huge paddles. The creature was Elasmosaurus, a carnivorous sea reptile. In the largest and best-known species yet found, 22 feet represents the neck in a total length of 51 feet. It is, of course, impossible to do more than speculate on the habits of the creature; yet it is reasonable to suppose that, like the snake-bird of Florida, Elasmosaurus often swarm far below the surface of the sea, now and then lifting its head above the water to take a breath of air, and then withdrawing it to search for food 40 feet below the surface, without in the slighest altering the position of its body. That the food for which it sought was made up of many kinds of fish, is proved by the teeth and scabs found among its bones in the position of its stomach. That it was a powerful swimmer, fearing neither wind nor waves, is proved by the great distances at which its remains are found from shore.

But a greater than Elasmosaurus swam in the cretaceous sea, and was, indeed, the ruler of the waters. This creature has been named Pythomorpha. The bones collected by Professor Cope* show it to have been a singular mixture of snake and fish. In the largest species the body must have measured 75 feet. The head was large and flat and conic, with a long projecting muzzle, not unlike that of the blunt-nosed sturgeon. The eyes were directed upwards, and the roof of the mouth was like the mouth of a snake, furnished with four rows of double teeth. Such teeth could not, of course, have been of any use in mastication, but were designed simply as weapons for seizing prey. You will recall that the teeth of a snake, instead of pointing vertically upwards and downwards, point backwards in the mouth, and, by the forward and backwack motion of the jaws, act as rakes or clutches, which grip the food and assist in forcing it down the throat. The teeth of Pythomorpha did the same duty, and its habit of swallowing its food entire gave rise to a most peculiar arrangement of the jaw. The snake possesses an extension-jaw, so to speak, which gives wonderful expansibility of throat. The lower jaw is supported by a system

* The descriptions of Elasmosaurus and Pythomorpha are taken from the writings of Professor Cope.

of levers, which fold up when the mouth is empty, but are called into play the moment any large body is to be swallowed, shove down the lower jaw, and so greatly increase the capacity of throat. Instead of this, each half of the lower jaw of Pythomorpha was jointed at a point nearly midway between the ear and the chin. The joint was of the ordinary ball-and-socket type, and enabled the jaw to make an angle outward. This arrangement may, to a certain extent, be represented by holding the hands near together. By turning the elbows outward and bending them the space between the arms becomes diamond-shaped and represents exactly the expansion in the jaws of these reptiles to permit the passage of large fish entire.

From this peculiarity follows a long train of consequences, which may be mentioned as illustrating the mode of reconstructing animals from their bones. The habit of swallowing food entire must have necessitated the prolongation forward of the mouth of the gullet. The throat, therefore, of Pythomorpha must have been as loose and boggy as a pelican's. But the glottis or opening of the windpipe is always in front of the gullet. In Pythomorpha the glottis must, in consequence of the position of the gullet, have been well forward in the mouth, and the creature could have uttered no other sound than a hiss.

Elasmosaurus and Pythomorpha were the largest creatures known to have swam in the cretaceous sea, but those waters were no less remarkable for their fish than for their reptiles. Sharks seem to have been few in number, but the waves swarmed with great predaceous fishes related to the salmon. In the largest specimen yet found, the head is a few inches larger than that of a fully-grown grizzly bear, the muzzle is deeper than that of a bull-dog and the teeth as long as the fangs of a tiger. A few of these in each jaw projected three inches beyond the gums and are sunk in pits an inch deep.

The remains of such fish, plentiful as they are, fall far short of those of a smaller variety, somewhat allied to the herring. Travelers over the Union Pacific Railroad are familiar with them. They are exposed for sale at almost every station from Cheyenne to Salt Lake. But their distribution in nature is by no means so diffuse

They are limited to a few localities, where they occur in great numbers. One such fish-bed is just out of Green River City, and was opened up while making a cutting for the railroad. A second one is at Morgan's meadows, some 25 miles south. These meadows are in a long and very narrow valley, along the bed of which flowed a stream of clear water scarcely a dozen feet wide; for a hundred feet or so on each side of the stream grows tall, rank grass, and where the grass ends the bluffs begin. For a thousand feet along the sides of the valley the underlying beds of shale crop out from the bluffs and rise in benches, one above the other, for a height of 300 feet, presenting such a sight as can be seen nowhere out of that region. The face of each bench is almost vertical, but exceedingly irregular. Huge masses of shale stand out like buttresses or jut out in overhanging slabs and shelves, or hang from the walls like oriel windows, and present a constant succession of richly colored strata—some brown, some buff, some vermillion, orange, gray, pink, salmon color, slate, blue and white. In a brown strata, scarcely 50 feet up the bluff, are the fish. To obtain them, great lumps of the shale are broken off with a pick or crowbar, and the thin layers of the strata scaled off with a knife. On the slabs thus obtained will often be found five to eight fish crowded together within an area of a square foot. Nor is it by any means uncommon to see three fish lying one across the other, in so fine a state of preservation that the color of some of their scales can be detected.

To account for the presence of such multitudes of fish within so small an area, all manner of theories have been advanced. Some have asserted that these places were the favorite spawning grounds of the fish, which, returning each succeeding year, perished in great numbers. Others, again, will have it that the fish-beds mark the mouth of streams or rivers which emptied into the cretaceous sea, and brought down in the waters food of which the fish were fond; that great schools of them congregated at such places, and, as they died, were quickly covered up by the silt of the river. But there are not wanting those who argue from the fact that so many fish are found in the same strata, so close together and so well preserved, to the conclusion that they must all have died at the same time and been almost immediately covered. That they were, in a word,

buried up by the fall of an overhanging bank, by a landslide, or killed by an earthquake. Yet a fourth theory supposes the fish-beds to mark the site of estuaries or arms of the sea which were cut off and turned into ponds and lakes, where the fish died from the freshening of the water.

While there is thus much reason to believe that such fish as have come down to our time as fossils met with an untimely end through the violence of nature, there is no reason to doubt that many more suffered from the rapacity of a creature which, like Milton's fiend, was equally at home in the air, in the water, on the land.

This animal was, indeed, a strange mixture of fish, flesh and fowl. When the first skeleton, almost a perfect one, was discovered in Europe, the doctors could not at all agree as to what it was. One held firmly to the opinion that it was a bird; a second firmly maintained that the skeleton was that of a bat, while a third was quite sure the remains could be those of nothing else than a flying reptile. Nor was either opinion groundless. The shape of the head and the length of the neck were very like those of a bird. The wings, in form and proportions, closely resembled the wings of a bat, while the body and tail were not unlike the similar parts of reptiles. As is usual among reptiles, the head was small, but armed with a large beak, containing not less than sixty sharply-pointed teeth. The eyes were of great size, to enable the creature, it is quite probable, to see at night. From the wings projected fingers ending in long hooks, like the curved claws on the thumb of a bat. Besides this, the Pterodactyl (such was the reptile's name) was armed with a paw, enabling it to climb or creep, or hang suspended from the limbs of trees, or stand erect on the ground and walk with wings folded after the manner of birds. In a word, if you can imagine a creature with small body, long neck, small head, large eyes, a beak armed with teeth, and large, leathery bat wings provided with hooked fingers, you will have some idea of the pterodoctyl. In one specimen the spread of the wings was 18 feet, in another 25 feet.

On the land the animals were quite as numerous and remarkable as in the sea. The mere mention of their names would be as tedious as the catalogue of the ships in Homer. Yet a few of them may safely be given, as illustrative of the life of the times. There, for

instance, lived the rhinoceros; the procamelus, the forerunner of the camel, and the orohippus, or mountain horse, not much larger than a fox, and believed to have been the ancestor of the horse. There, too, were species closely allied to the cat, the fox, the beaver, the porcupine, the wolf, bats and squirrels, moles and monkeys. But the most numerous of all were crocodiles and turtles. The country, indeed, must have swarmed with them. Their remains, rarely in a well preserved state, are scattered along the bed of every little cañon and ravine in the bad lands, lie bleaching on the top of every beach, protrude from the faces of the butts, and are a veritable nuisance to the searcher after more interesting remains. Many a time have I seen, 40 or 50 feet up the side of an almost perpendicular wall of sandstone, one of the peculiar spots that invariably indicate the presence of bones, have climbed up with the greatest caution on hands and knees, gained a footing on some projecting ledge and stretched up, to find myself confronted by a turtle gone utterly to pieces, or by the remnants of a crocodile jaw, easily recognized by its peculiar pock-marked appearance. Yet the fact that so many fragments of the crocodile are found is not without interest, as, till a few years ago, they were not known to exist anywhere on this continent. Some few years ago four of them were found in a swamp in Florida, and even these are held to be doubtful specimens. Alligators there are in plenty along the Mississippi and in the Gulf States. But the alligator and the crocodile are quite different. Not to enter into minute differences, there is one easily seen and remembered. In the alligator, the upper entirely covers the lower jaw, so that the teeth of the lower jaw fit into sockets in the upper jaw. In the crocodile, the upper jaw contracts just back of the snout, and a whole row of lower teeth come up outside the upper jaw like tusks. Perhaps the distinction will be made more apparent by showing, on the screen, a photograph of the finest crocodile head yet found in the Wyoming bad lands.

In the same beds with these reptiles are the remains of purely land animals of more than elephantine proportions. Such was the Dinoceros discovered by Professor Marsh. The animal was somewhat larger than the elephant and armed with both horns and tusks: one pair of small ones on the snout, a second pair a little further

back, and a third and largest pair quite far back on the head. Besides these, there came from the upper jaw a pair of tusks eight inches long. Another monster was the Tlixtatherium ; another the Coryphodon ; another Palæosyops, closely related to the tapir ; another Byrachyos, remotely connected with the rhinoceros ; another the Tillotherium, an animal which combined the head of a bear with the incisors of a rodent, and many of the characteristics of hoofed animals. But a more remarkable still was Oncodon. This was intermediate between the hog, the deer and the camel. The Loxolophodon was intermediate between the elephant and the tapir.

Why the remains of such land animals should be found huddled together with those of marine animals in some localities, and not a bone of them to be found at other places but a few miles away, is not known. The reason can only be guessed at. One theory offered in explanation is, that the spots now so rich in bones were, in tertiary days, great swamps or marshes where the creatures came to wallow, and were mired. Another regards such places as the margins of lakes to which the Loxalophodons, the Coryphodons, the Oncodons, driven from their feeding grounds by droughts, came in herds in search of water, and that when the edge of the lake was reached those in front were driven into the water and trampled on by the rush of the thirsty ones in the rear, and so perished. This is precisely what takes place every few years on the South American Pampas. Still another theory is that the bones are those of animals drowned while attempting to swim a lake or river; that the remains, carried out to sea, were there torn to pieces by the sea carnivores, and that the spots where they are now found mark some quiet eddy into which the currents swept and left them.

This was undoubtedly the case with smaller animal remains. Some fifty miles south of the railroad is a great butte noted on the maps as Twin Buttes. It takes its name from two lofty mounds separated by a narrow cañon. The smaller of the twins is conical in shape, some 600 feet high and eroded into a series of benches, and cannot be better described than a mass of animal remains in a sandstone matrix. There are found the teeth and scales of fish, the vertebræ of snakes, the scutes of lizards, jaws not half an inch long, bones not thicker then a match, and the little brown teeth of Hyop-

sodus, a species of monkey. The existence of such a conglomeration of remains of land and water animals, all of them so small that the fossil hunter is compelled to creep along the benches on hands and knees to find them, is reasonably explained by the supposition that they were brought there by water. In such spots leaves are never found. They were far too tender to bear transportation by currents. Indeed, wherever leaves are found, the evidence is conclusive that they were deposited in the sediment that accumulated on the beds of fresh water streams or lakes, and they are spread out so smoothly and so entire that no violence, not even that of a rapid current, could have been attendant on their deposition.

While we may thus from the bones reconstruct the animal and from the leaves the plant or tree, so, when the knowledge thus obtained of the plants and animals is joined to our knowledge of the sea margins gained from a study of the rocks, we may with much safety pronounce on the physical features of the land, its climate and its life. From all that we now know, the desert region of Wyoming was once a very pleasant country, a tropical country, rich in herbage and teeming with life. The groves of palms, the sombre forests of poplars, the woods of sassafras and sycamores, the swamps thick with rank grasses and reeds larger than a man's arm; the monstrous crocodiles; the turtles, larger by far than any now existing; the Pterodactyles, spreading out their leathery wings for 25 feet; the sea swarming with reptiles in comparison with which the largest whales sink into contemptible insignificance; the droves of camels and diminutive horses; the monkeys, the tigers, the foxes, the herds of beasts larger than an elephant and more strange than were ever seen in the wildest dream,—make up a land the like of which does not now anywhere exist.

But all this has gone, and the explorer who now enters the "Bad Lands" of Wyoming for the first time can easily fancy that he is the last man. The utter desolation of the place, the dried up water-courses, the absence of every living, moving thing, the profound silence which prevails, produce a feeling quite oppressive; and as he beholds the chips and fragments of bones around him, can scarcely realize that he is looking on all that is left of a great world, which had utterly passed away before the first articulate word was spoken, or the first of human beings looked upon the sun.

A JOURNEY AROUND THE WORLD.

BY

BENJAMIN ROBBINS CURTIS, ESQ., OF BOSTON.

I invite you all to accompany me this evening on a journey around the world. We shall be obliged to travel *very rapidly;* and I doubt if even the electric telegraph itself can cause a despatch to circle the globe in the short time that I have been kindly allowed to claim your attention. But, though we must move so quickly, we can still accomplish much, for we shall travel by a veritable air-line; we shall not be dependent upon railroads or steamboats; and in spirit we will take the wings of the morning and fly to the uttermost parts of the sea.

Having obtained from the State Department at Washington the usual passport provided by our government for travelers in distant lands, we will bid farewell to our friends at home, take with us as little baggage as possible, and turn our faces westward to San Francisco. As our steamer, which will carry us from San Francisco to Japan, is advertised to sail out of the Golden Gate in a little less than a month from the time of our departure, we shall not have time to linger long over the many wonders of our own country. But we will visit, nevertheless, some of the chief objects of interest *en route*, and we will become somewhat acquainted with the most important natural curiosities for which the Great West is famous.

Our first stop will be at Niagara Falls, a good view of which we will obtain from the American side ; and we will remain here long enough to witness this great cataract by moonlight. We will then pass quickly through the cities of Detroit and Chicago, and will rush on thence to St. Louis, passing over the great bridge across the Mississippi river, which has been pronounced a "wonder of engineering art and mechanical construction." We will travel thence over the Kansas Pacific Railroad to Denver, from which city a little narrow-gauge railroad runs directly up the celebrated Colorado cañon. This road, built as it is along the banks of streams and

through cuts in the solid rock, which rises so high above one's head that it almost shuts out the sky, is a tribute to man's superiority to the obstructions Nature has placed in his way. The traveler is pushed slowly up the gorge, a towering mass of rocks on the one hand, and on the other, far below, a quickly flowing stream, hissing and gurgling over stones and fallen trees and old mill-wheels. Magnificent mountain views, constantly changing, are everywhere to be seen; finally the terminus of the road is reached, and we arrive at a characteristic mining town called Central City. On all sides, and stretching away off into the distance, countless peaks, many snow-capped, thrust their heads upwards, while a thin bluish haze floats around them, brought out into stronger relief by the excessive clearness of the air elsewhere. We must now turn our faces back to Denver and proceed to Cheyenne to meet the Union Pacific Railroad, which will carry us farther west. We are bound to Salt Lake City, and leaving the Union Pacific Railroad at Ogden, we proceed by a branch road into the heart of Mormonism. The streets are broad and shady; the houses, mostly built of wood, are set a little back from the roads, and each one possesses its own plot of ground, where flowers or vegetables are cultivated. A city? No; rather a great caravanserai in the centre of a burning desert. The roofs of most of the houses are flat, and little gardens are sprouting from them, forming pleasant resting-spots for evening-time. One can hardly believe he is in an American city. A strange moral atmosphere pervades the place. The passers-by seem filled with a consciousness of a Presence which is ever at their doors; whose laws they must obey, whose continual supervision they cannot escape. We will now walk to another point, from which a good general view of the city can be obtained. The situation of Salt Lake is extremely picturesque. It lies at the foot of the Wahsatch mountains, whose snow-capped hills contrast beautifully with the deep blue of the sky. Considering its desert surroundings, it is well called by "the Saints" the "Eden" of the land. The population is about thirty thousand. A United States military post, Fort Douglas, overlooks the whole city, which could soon be laid low by the powerful guns which seem to be continually watching it.

After visiting the great Mormon Tabernacle and the residence of

the late Brigham Young, we set out for the Great Salt Lake. It is reached by a little narrow gauge railroad, which was built by Brigham Young, and which extends southward from Salt Lake City for about 30 miles. After traveling about two hours the train stops at Lake Side. This consists of a small hotel built directly on the water's edge, a long pier, near which is a little steamboat, and several bathing houses. The lake is an immense sheet of water, 100 miles long and 40 miles broad. To-day it lies before us with scarcely a ripple on its surface. No fish leap up out of its depths, no insects scurry along its top. It is a *dead* sea.

We will now continue our journey westward to San Francisco, stopping first to get a view of some of the great trees of Calaveras. There are only two species of this genus known to botanists: the *Sequoia gigantea*, or Big Tree, and the *Sequoia sempervirens*, or Redwood. The latter are very numerous, and are found all along the coast range. The former have been found only in the Sierra Nevada mountains. The largest tree is called the "Father of the Forest," and measures 112 feet in circumference and 430 feet in height. This tree now lies at full length, having been uprooted in a terrible storm seven years ago. Upon a section of another tree, 25 feet in diameter, a house has been erected, and 32 persons are said to have danced there at one time. Another immense fellow, 18 feet in diameter, is stretched on the ground, and persons on horseback, entering through a knot-hole, can ride into the tree for 200 feet.

Leaving the great trees, we will descend the mountain to the long-sought-for Yosemite valley. Yosemite is an Indian word, which means "large grizzly bear." The valley is a deep and wide fissure or gorge in the Sierra Nevada mountains, within about 25 miles of their very topmost crest, and lying nearly due east from San Francisco. It is a little over seven miles in length by half a mile to a mile and a quarter in width. Its total area comprises 8,480 acres, 3,109 of which are meadow land. The entire grant to the State was 36,111 acres, and includes one mile back of the edge of the precipice, throughout its whole circumference.

"The altitude of the bottom or meadow land of the valley is 4,000 feet above the sea; while on either side the walls—which are

of beautiful gray granite of many shades—rise to the height of from 3,300 to 5,300 feet above the meadow, and are of every conceivable shape. A remarkably picturesque and beautiful river—the Merced, —full of delicious trout, and clear as crystal, runs through it, and then roars and plunges down an almost impassible cañon, entering the San Joaquin river about 60 miles south of the city of Stockton. Deciduous and evergreen trees—from the shade-giving oak to the stately pine—form picturesque groups over valley and river; in places presenting long vistas that seem like frames to many glorious pictures." We will go on horseback to Glacier Point and look out over the tops of the mighty mountains.

The time of departure for our Pacific Mail steamer is at hand. We will travel rapidly to San Francisco and walk to the upper end of Montgomery street, whence we can look through the famous Golden Gate, where our steamer is soon to pass on its way to Japan. In 24 hours after this we are on the broad Pacific. America has faded from view: a dense fog, rolling in from the sea, wreathes itself round every portion of our ship, and a few sombre sea-gulls, lazily sweeping along in our vessel's wake, alone remain to connect us with the world we have left. We fall at once into the miserable "land-swell;" the ship pitches terribly; the lady passengers retire to their berths, while more than one gentleman hurries away from the dinner-table in silent communion with himself.

I shall not describe the voyage across the Pacific. Three weeks pass slowly by. Days come and go, one generally the repetition of another. At last the welcome cry of "land" is heard throughout the ship, and far ahead, "cloud-like, we see the shore" of Japan. As we continue to advance, the shore grows more and more distinct. Directly before us, seemingly only a little distance from the sea, a conical mountain lifts its head above the clouds. It is sacred Fusiyama, the holy mount of Japan, which rises 14,000 feet above the sea. Immediately our ship is surrounded by multitudes of native boats —*sampans* —a long narrow sort of canoe, propelled by half-naked Japanese, with long oars, with which they scull the crafts to and fro with wonderful skill and precision. We seat ourselves in one of these *sampans*, and our boatmen, keeping time to a peculiar cry, row us quickly ashore.

After remaining a few days in Yokohama, we will set out for the interior on horseback, and will pass along the Tokaido, the great highway across Japan from Yokohama to Kioto. The road is wide, shaded by trees, which form in many places a complete arch, while on either side are peasants' houses, with their heavy roofs of thatch. Here is a woman drawing water from a well; there we see a mother carrying her baby; an old porter passes by, who is carrying his neighbor's household utensils from place to place for a small fee. A little further on we see a group of natives preparing rice for the market, others are slowly pushing along a heavy load of tea-chests, and behind them comes a peasant woman in walking costume. We stop at a tea-house by the side of the road, and are waited on by polite attendants. The little daughter of the proprietor brings us a refreshing cup of tea. Here we meet and are introduced to a couple of *Samuri*, or two-sworded men. We proceed on our way through a heavy rain, and we find that we are not so well protected from the shower as some natives who pass by dressed for the storm. After riding for about an hour, we dismount at a foot of a flight of wide stone steps, and, leaving our horses, ascend the steps, and, passing under a huge stone gateway, stop involuntarily; for there before us, its face in deep, calm repose, is the bronze idol of Daibutsu, Great Buddha, the realization, in countenance, of entire rest and complete annihilation of care! This remarkable image is 44 feet in height, 87 feet in circumference of base, 8½ in length of face, 3½ in length of eyes, 3 in width of mouth, and 34 in diameter of knees. It was erected, hundreds of years ago, with the desire of displaying to the worshipers of the god a picture of that perfect, blissful peace of the world to come, for which all should strive by a strict observance of the rules of the sect, and which is only to be obtained by a long and faithful probation of the body. This ideal has surely been realized in the bronze, and it seems to me it would be difficult to find another face expressing such absolute repose. The drooping lids, the serene mouth, and the calm joy in the expression of the whole—as of one who has striven for a longed-for object for a lifetime, and at last has obtained the result to which he has consecrated his whole being—all this strikes the beholder, and keeps him long in silent admiration. And as we walk slowly across

the beautiful park, over which a deep silence reigns, broken only by the musical notes of birds flitting from tree to tree, we almost fear to tread loudly lest we awaken the god from a slumber.

After talking for a few minutes with the priest who lives near by, we pass through a doorway at the base of the idol, and ascend a flight of steps leading up to the interior of the head. A little shrine has been erected here. Having descended to the ground, we remount our horses and continue our journey to Kamakura. As we are leaving the courtyard, we turn to take a last look at Daibutsu. The expression of the face seems changed! The countenance is still, indeed, clothed with peace, but the mouth now has a scornful curl, indicating, as it were, that those who can reach the blissful state are very, very few. Returning to Yeddo, we will visit one of the great temples at Shiba. This is the outer gateway. Passing this, we come into the inner sanctuary. Then we go to the old palace of the former Tycoon, with its moat and drawbridge, its bastions formed of solid stones, one of which is 32 feet long. After presenting a letter to a Japanese gentleman of position, we are introduced to his wife, beautifully attired in native dress. Then we return to Yokohama, and embark on a steamer which carries us through the famous Inland Sea. Our vessel glides through calm water, and passes within a stone's-throw of beautiful green hills, which rise boldly from the sea. Soon we see Papenberg, a perpendicular wall of rock, from whose summit many Christians were hurled in 1636. In a few hours after this we enter the harbor of Nagasaki. Nagasaki is built at the foot of a semicircle of high hills. The European quarter is situated to the east. On the western side is Detsima, the former Dutch factory, and behind this stretches the native town. Nagasaki became a treaty port in 1858. Before this, the Dutch had entire control of the trade, but they were so restricted and so carefully watched by the natives that they could only have regarded themselves as prisoners.

Exquisite tortoiseshell work, and tasteful and delicate porcelain ware, are the chief productions. You have all heard of the terrible typhoons of the tropical seas. I will show you this same Nagasaki after the disastrous typhoon of 1874, with its wharves totally destroyed. Again we embark on a steamer, and turn our faces

towards the Celestial Empire of China, and after a two days' voyage we cast anchor in the harbor of Shanghai. Shanghai, 1,190 miles distant from Yokohama and 800 miles from Hong Kong, was opened to foreign trade in 1846. The foreigners (in number about 4,000) live apart from the natives, in a reservation which is composed of the American, the English, and the French "quarters." Shanghai contains probably the finest warehouses and private establishments of any city in the empire. We are here, on our landing, introduced to a couple of military mandarins in full regalia. Walking out through the native city, we see a characteristic family group outside a peasant's cottage. Near by a porter is rapidly trundling along a fellow-craftsman, homeward bound with a recent purchase. In another part of the city we meet a long marriage procession, the bride in an elaborate sedan-chair preceding the groom, who is carried after her on his way to his own house. The peculiar type of the native women is well shown in another family group near at hand.

As we are bound directly to the north, to Peking and the Great Wall, we proceed by steamer to Tien-tsin, 725 miles from Shanghai, where we take horses for our overland journey. The distance from here across country to Peking is 80 miles, and it must be accomplished on horseback in two days. At the end of the first 40 miles we stop at one of the rude Chinese inns with which all overland travelers are obliged to content themselves. A Chinese inn is decidedly uninviting in its general outward appearance, and a closer acquaintance with its interior arrangements is scarcely more encouraging. A wall of mud and bricks, about eight feet high, shuts in the premises from the village street, and passing this you find yourself in a sort of quadrangle with low brick buildings on three sides, partly devoted to cattle and partly to men. Being a foreigner, you are met, on your arrival, by the proprietor, and you are led at once to the best room. This turns out to be a little chamber about 15 by 20 feet, in which is a table, four chairs, and a brick *cong*—a sort of platform, about six feet long and three feet high. Upon this you are to stretch your mattress, which (of course) you have brought with you. The very next partition to yours, possibly, may be a simple stall in which are quartered

horses, mules, camels, or sheep! Rice, eggs, mutton and tea may be obtained, but everybody brings food with them. In cold weather a sort of stove under each *cong* is filled with charcoal, and the bricks are comfortably warmed. The usual Chinese inn is dirty and thoroughly uncomfortable, and a foreigner is sure to have at least a quarter of the village surrounding his door from the first moment of his arrival, watching his every movement, and gazing in deep astonishment at his peculiar method of conveying his food to his mouth. An empty bottle or sardine-box is highly prized, and a fierce wrangle is caused by tossing one out of the inn door.

It is impossible for a traveler to sleep uninterruptedly at a Chinese inn. From hour to hour one hears loud cries from men, shrill blasts of horns, the beating of drums, the explosion of fire-crackers, and a peculiar noise made by the town watchman by striking together two sticks of wood. Soon after daybreak, moreover, the whole inn is astir. The courtyard is filled with a crowd of men and beasts, and further sleep is out of the question.

At the end of the second day we enter the great city of Peking. This contains about 2,000,000 inhabitants. Three great walls surround it. The streets are unusually wide for a Chinese city, and if it were not for the total absence of sewers and the abominable habits of the people, the pure air from the neighboring hills would render it quite a desirable residence. The most important personage in Peking is Kung-Chi-Wong, or Prince Kung, uncle of the young Emperor, and Regent of China. Near his residence is the celebrated Marble Bridge. This structure spans a wide stream, running close to the Imperial buildings, full of lotos-flowers and great masses of decaying weeds and general rottenness. With proper care, this rivulet might be kept clear and fresh, and such was undoubtedly the intention of the Emperor, who planned the surrounding pleasure parks and grounds, but it is neglected, along with so much else in China.

Here we meet a local mandarin of high rank, accompanied by his two native secretaries. Thence we visit a police court, where very doubtful justice is dispensed with absolute oriental carelessness. Then we pay a visit to the great Bell Temple, where hangs the second largest bell in the world, 18 feet high and 36 feet in

circumference. It was cast A.D. 1400. The Llama Pagoda next claims our attention, which is considered the most beautiful in China. It contains near the base some magnificent carving. As we are passing an opium house we will step in for a moment. Two wretches are under the influence of the drug.

We go now to the celebrated Temple of Heaven, where the Emperor worships once every year. The Temple of Heaven is a pagoda-like structure, covered with blue tiles. Three umbrella-like roofs rise, one above another, from the blue walls below. These walls are elaborately sculptured and enameled, and are inlaid with glass-work. Three white marble terraces, finely carved, surround it. Near by are three bronze vessels, in which the papers of criminals of high rank are burned. Behind is the spot where cattle are slaughtered for the yearly sacrifice, performed by the Emperor after worshipping in the temple.

The door of the temple is bolted, but we can easily look in through the windows. No idols of any sort are to be seen. The interior pillars and wood-work are solid but plain. Once a year in this place he who calls himself "Ruler of the Earth" bows down before the Sovereign of Heaven.

Close by we see a couple of miserable wretches undergoing the punishment of the *Cangue*, or pillory. Continuing our way, we ride about two miles outside of the city to the ruins of the celebrated Summer Palace of the Emperors. This magnificent residence was destroyed by the foreign allied forces in 1860, in return for indignities offered by the Chinese to the English Minister, Sir Harry Parkes. We pass first through a succession of gates, each shutting in what must formerly have been beautiful pleasure-parks. On our right hand are the ruins, extending to the top of a high hill, on the summit of which—its imperial yellow roof and tiles glistening in the sun like gold—stands the only building that remains from the terrible desolation that was spread over the whole. The front of this structure contains innumerable little Buddhas, standing in niches very near together. The view from the top of the hill, where the building stands, is one of the finest in the vicinity of Peking, and the varied prospect of lake, valley and mountains must have pleased even an emperor. But now palace walls are crumbling to

pieces; stone lions, bronze gods and marble pagodas lie heaped in an indiscriminate mass, covered all over with fragments of the blue, yellow and green bricks of which the royal buildings were mainly constructed.

Leaving this scene of desolation, we will continue our way on horseback to the Ming Tombs and the Great Wall. The Ming Tombs are the tombs of the Ming dynasty, who ruled from 1368–1628. A long avenue leads up to the tombs, on each side of which are colossal figures of blue marble. Two pairs of lions, unicorns, camels, horses and elephants compose the group, all finely carved, and next to these are ranged colossal priests and warriors, some with huge swords, who seem to be guarding these precincts of the dead. The elephants are 13 feet high and 7 long. At the end of the long avenue can be seen the tomb of Yung Lo, the founder of the Ming dynasty. We continue our journey towards the Great Wall, and stop for the night at Nan Kow, at the entrance to the pass of the same name. This pass is a Chinese road, so called. The traveler must proceed on foot, or on the back of a mule, or in a mule-litter. After riding about four hours, we emerge from the pass, and soon arrive at the Great Wall, which stretches over the hills far off into the distance. At certain intervals steps lead up to the top. The wall is about 40 feet high and 12 feet wide. It is built of a hard gray stone. Against modern artillery it would be of little avail. The wall was begun B. C. 200. It is about 1,200 miles long, and surmounts the highest and most inaccessible peaks in the vicinity.

We ascend to the summit. On the high mountains, stretching away into the distance, can be distinguished the thin gray line of the wall. On the plain below, a long procession of heavily loaded camels is winding slowly on, the shouts of the drivers echoing through the hills. Except this, all is quiet and still. Before us is an Asiatic picture which will never be effaced from our minds.

Having now visited these interesting historical objects in the north of China, we turn our faces southward to Hong Kong, and after a pleasant voyage of about a week, cast anchor in the harbor opposite the city. Hong Kong (Island of Sweet Water) was seized by the English in 1842, in return for the destruction of opium by the Chinese, and for various insults to British residents at Canton.

Hong Kong is built on an island, and the town is planted at the base and on the side of the precipitous Victoria peak, which rises perpendicularly for 1,800 feet. It is said that one can drop a stone from the summit into the main street of the town below. The population of Hong Kong is made up of different nationalities, and varies so continually that it is impossible to state it exactly. In round numbers, it is about 135,000. The foreigners number about 3,500. The harbor is large and convenient, and is full of steamers and sailing vessels from all parts of the world. The warehouses of the merchants are commodious and well built; the private residences and villas, nestling in different parts of the hill, form agreeable retreats after the toil of the day.

We will now ascend Victoria peak, and stop at the little house that is built on the top. From here a fine bird's-eye view of the city and harbor can be obtained.

On our way down the hill we pass one of the traveling restaurants. These are much patronized by the working classes. Then we will pay a visit to a celebrated mandarin and his wife, whose house is pleasantly situated near by. We are received in his audience-room, which is a good example of the reception-room of a native official. As a contrast to this, we will call at the residence of an English merchant, to observe the manner of life of foreigners in the East. His parlor is large, well furnished, and comfortable. His pleasant dining-room adjoining is provided with a punkah, or great fan, which is used so much in hot countries. Then we will stop at Government House, the residence of the English Governor-General. Before our departure from Hong Kong, we will go to the celebrated race-course of the foreigners, beautifully situated in the Happy Valley, so called. Then we step in for a moment at the Chinese theatre, where a play is going on which has continued every day for the past week from four o'clock of the afternoon until daybreak of the following morning. Under the guidance of a friend, we proceed inland a mile, where a large vessel was carried bodily by the great typhoon of 1874, and deposited near a pagoda. Thence we go by steamer from Hong Kong up the Canton or Pearl river to Canton, a distance of 90 miles, and cast anchor in the river opposite the city, in the midst of a perfect flotilla of the famous

"house boats." These boats are the homes of a large portion of the population of the city. Women and young girls take the place of the men (who for the most part are employed elsewhere), and mothers with their babies strapped on their backs wield a long oar with wonderful muscular power. Often, too, the mothers tie their very youngest children to the deck by a long cord, while those of a few years tumble about with a bamboo float fastened around them, which serves at once for clothing and life-preserver. Canton river swarms with life. Regular streets are formed by "the house boats," which are placed side by side, and the multitude of men, women and children (of all ages), dogs, ducks and chickens that are packed away in them for the night is appalling. Then we leave the steamer and enter one of the streets of the city. Canton is distant 90 miles from Hong Kong and 80 miles from Macao. It contains a population of 1,000,000 in the city proper, while 250,000 live in boats. A large foreign population still dwells on the reservation, but the number has been considerably diminished of late years, owing to the stagnation of trade. We will lunch at one of the numerous floating restaurants anchored off the city, where a dinner is served in true Chinese style, and of which, being foreigners, we partake sparingly. Continuing our way, we come suddenly on to the execution ground of the city. A criminal is about to pay the penalty of his crimes, and the stolid faces of the spectators indicate the carelessness with which they regard the death of a human being. Close by is a large Buddhist temple, and we enter and pay our respects to the various divinities therein. As our time is short, we must rejoin the steamer and proceed to Macao, a distance of 80 miles.

Macao was settled by the Portuguese A. D. 1547; and though this nation has held it ever since, and filled it with her own citizens and soldiery, still China has always insisted that it is in reality under her dominion. A lovely place it is, with a long curved beach, and with boldly-rising hills around, on whose summits fleecy clouds rest constantly. In front of the town are several islands. The typhoon of September, 1874, did great damage to the town and harbor, but the traces of the disaster are nearly removed.

Here the Portuguese poet Camoës died in 1580. A monument has

been erected to his memory, inscribed with the following beautiful poem written by Sir John Bowring:

SONNET TO MACAO.

"Gem of the Orient Earth and open sea,
Macao! That in thy lap and on thy breast
Hast gathered beauties all the loveliest
Which the sun smiles (on) in his majesty!

"The very clouds that top each mountain's crest
Seem to repose there, lingering lovingly.
How full of grace the green Cathayon tree
Bends to the breeze, and now thy sands are prest

"With gentlest waves, which ever and anon
Break their awakened furies on thy shore!
Where these the scenes that poet looked upon
Whose lyre, though known to fame, knew misery more?

"They have their glories, and earth's diadems
Have nought so bright as genius' gilded gems."

We continue our journey, and in another week cast anchor in Singapore harbor. Singapore, the capital of the Straits settlements, is situated one degree north of the equator. It was founded in 1819, and transferred by the Indian government to the Crown in 1867. The population is about 100,000, of whom 800 are English, Americans and Europeans. Singapore is one of the great highways of the world, and contains representatives of nearly every race of men on the globe. The business part of the town contains many fine buildings, and the large and comfortable dwellings of the merchants are pleasantly situated in the suburbs. The town possesses a large Episcopal church, several massive government buildings, and a spacious residence occupied by the Governor. A strong fort overlooks the harbor. There are many beautiful gardens and excellent roads in the vicinity, while an unchanging and agreeable climate, luxurious tropical vegetation and a profusion of delicious fruit combine to render Singapore a most enjoyable residence for man.

In the immediate vicinity of Singapore is a beautiful cocoanut grove

and close by are the celebrated giant ferns. Returning to the town, we again embark and, crossing the Indian ocean, at the end of three days we come in sight of the island of Java, and anchor off Batavia. The population of Batavia is about 100,000. It possesses, besides its many private residences and warehouses, an opera-house, several very ordinary hotels, a fine museum, and a handsome residence occupied by the Governor-General. The climate is hotter than our very warmest summer day, and no one walks out in the middle of the day, for the sun has a very dangerous power. Many sorts of fruits can be obtained, and all may be eaten with safety, except the pineapple, which in Java is exceedingly hurtful.

On landing, we are driven rapidly to the chief hotel. In the afternoon we visit a Dutch merchant, who receives us in his bungalow. He accompanies us to a horticultural exhibition, where we see a beautiful pyramid of all the Javanese fruits. Close by is a museum containing the many different weapons of the natives. After passing a few days in Batavia, we proceed inland for about 20 miles, to visit a coffee planter. Our host accompanies us to a celebrated lake, surrounded by exquisite tropical scenery. We stop for the night at a little hotel in Buitenzorg, from which a lovely inland view is obtained. The Hotel Bellevue at Buitenzorg is built on the summit of a hill, and, standing on the back piazza, the visitor sees before him one of the most beautiful views that the island affords. At the foot of the hill a winding river flows between tall groves of cocoanut, and through the very thickest tropical foliage; a cloud-topped mountain rises boldly in the distance. On its summit are found the curious birds'-nests which are so largely exported for food. The whole neighborhood abounds in lovely scenery and foliage. Our friend takes us to another beautiful spot. A little beyond is a native hut, and here we see also a specimen of the native cart, drawn by cattle. On our way back we are introduced to a Javanese lady of rank, the wife of the native Viceroy, who receives us in her house in the presence of her maid.

As our time is short we must be again on our way, and we will return to Batavia and take the steamer for Ceylon, and at the end of ten days the beautiful island comes in sight. As the steamer rounds the green promontory which marks the entrance to the

harbor of Point De Gall, a beautiful picture presents itself. On the right groves of cocoanut trees, surrounded with thick foliage, afford refreshing shade to a little cluster of native huts, which, with their thatched roofs, look tropical and primitive. On the left, a tall lighthouse rises boldly from a high ledge of rocks over which the sea tumbles and breaks, leaping upwards every little while in clouds of spray. In front lies the town, running from the seashore to the summit of a hill, and sheltered completely behind the guns of the English fort, which cover every approach to the harbor. In the distance is Adam's Peak, which rises to a height of 7,400 feet.

As soon as a steamer comes to anchor it is surrounded by multitudes of long, narrow boats called *catamarans*, each with two huge outriggers, to which is attached a thick log, which moves along near the surface of the water and steadies the whole craft. Indeed, these canoes are so narrow that, without this balancing-log, it would be impossible to navigate them.

On landing at Point De Galle, we are pestered by some of the dealers in precious stones. Travelers should be cautious how they purchase. We stop in at a coffee warehouse, where women are separating the berries into different grades. Then we make a call on an English merchant at his bungalow. He accompanies us to the Pettah, an old temple, beautifully carved. He invites us to proceed with him to Kandy, the old capital of the island, over the wonderful railroad, which runs in some places above the clouds. The railroad was started in 1859 by the late governor, Sir H. Ward. It runs through the thickest vegetation of the island, and for 12½ miles ascends an incline of one in 45, rising to an altitude of 1,700 feet at a station called Kaduganava. The journey to Kandy occupies nearly five hours. This time is required, as the train must go very slowly for the last third of the way. The cars wind over mountains, through long tunnels, and along the verge of apparently inaccessible heights, from which one can look far down into the valleys below. After a ride of a few hours we arrive at the old town of Kandy, once the residence of native rulers. It is very picturesquely situated. Here is the temple, which contains what is

said to be a veritable tooth of the great Buddha. It is called the Dalada, or the Temple of the Tooth.

And now, bidding farewell to lovely Ceylon, we must proceed by steamer along the southern coast of India, and after a voyage of two weeks we cast anchor in the Hooghly river opposite Calcutta. Calcutta (called so from Kali, a goddess, and Cuttah, a temple) is situated on the west bank of the Hooghly, about 110 miles from the mouth. The place has been in the possession of the English since 1664. The middle of the city is in the form of a square, with the Maidan, or park, in the centre. Here is Government House, the residence of the Viceroy. Near by is the town hall, hospital, court-house, and the new post-office. The native quarter is thickly inhabited, and contains bazaars, Hindoo pagodas and Mohammedan mosques. The streets of Calcutta are wide and clean, and the whole city, including the native quarter, is excellently drained. The entire population amounts to 1,000,000, of whom 20,000 are Europeans. The thermometer rarely falls below 52°, and seldom exceeds 100°.

But as there is not much of special or peculiar interest to travelers in this city, we decide to push on to Benares, and after a tiresome day's travel on the overland railroad we reach the city. Benares is situated on the left bank of the Ganges, 475 miles by rail from Calcutta. Its population amounts to about 174,000. It is regarded by the natives as the most holy city in India. Multitudes of pilgrims flock to Benares annually, and aged priests, expecting soon to die, hasten hither to rest their bones in the city's sacred soil. Indeed, men guilty of the foulest crimes believe that a visit to Benares and a solemn worship at some of its numberless shrines will bring forgiveness for their sins and will assure the safety of their souls hereafter.

As far back as the middle of the sixth century, Benares must have been a city of importance in many ways; for it was to the monastery, now called Sarnath, that Shakyamuni, the Great Buddha, came at that time, and, seating himself under a tree, preached for the first time the famous doctrines of Dharma and Nirvana, which have been since embraced by millions of people. Before this period Benares was the centre of Hindooism, and chief seat of its

authority. Benares is a city of no mean antiquity. 25 centuries ago, at the least, it was famous. When Babylon was struggling with Nineveh for supremacy, when Tyre was planting her colonies, when Athens was growing in strength, before Rome had become known, or Greece had contended with Persia, or Cyrus had added lustre to the Persian monarchy, or Nebuchadnezzar had captured Jerusalem and the inhabitants of Judea had been carried into captivity, she had already risen to greatness, if not to glory.

We will procure a boat and be rowed slowly along on the river in front of the city. The different towers, temples, mosques and palaces, of Hindoo and Saracenic styles, stretch along the river bank, and rise to the summit of a lofty cliff over a hundred feet high. In the holy waters of the Ganges hundreds of people are bathing; while others, who have performed their morning ablutions, are worshiping at some of the numerous shrines in the vicinity, or are conversing with pious Brahmins—called "Sons of the Ganges,"—who, seated under immense palm umbrellas, exhort the people or expound theological dogmas. We will leave the boat at this point to get another view of the temples, that will well repay us for our trouble. Proceeding a little further, we arrive opposite the great Mosque of Aurungzebe. Then we make our way to the palace of the Rajah of Benares, and are received by his Excellency and suite. The old gentleman has several elephants, which he will frequently allow foreigners to ride. The next day we go outside of the city to visit the famous ruins at Sarnath. This is said to have been the birthplace of Buddha. It is a solid round tower, 93 feet in diameter at the base, 110 feet in height above the surrounding ruins, and 128 feet above the general level of the country.

Now we must leave the city of Benares, and continue our journey to Lucknow by the railway, which we reach in about 12 hours. Lucknow was founded by the Hindoos. The modern town contains three quarters: the native portion, built by Akbar the Great in the middle of the 16th century; the court suburb, built by Asoof-ud-Dowlah in 1775; and lastly, to the north and west, the residences of the English officials and the cantonments of the troops. It is noted for its celebrated ruins of the great mutiny of 1857. This gateway is called the "Baillie Guard," from Colonel Baillie, one of the old

British Residents, who built it as a defence to the Residency in the early part of the present century. The stones of the archway are riddled with shot and shell, bearing witness to the fierce and incessant cannonade which was poured upon the whole place. Passing in, the large ruin building on the right is the Residency proper, in which Lawrence received his death-wound. The native revolt did not spread to Lucknow till the 29th of June. On the morning of that day Sir Henry Lawrence learned that a body of rebels was advancing upon the city, and on the following morning a picked portion of the garrison marched out to meet them. Having marched six miles from the city, the Englishmen were astonished to find a complete army, composed of an irresistible force of all arms, drawn up in order of battle. The native artillerymen, on the side of the English, at once deserted their guns; the howitzer was immediately captured by the enemy; the small British force was speedily surrounded. Colonel Case, of the 32d, and nearly a hundred of his men were killed. The siege began on the 1st of July. On the 4th the brave Lawrence expired, killed by a shell thrown from his own lost howitzer, which entered a room in the Residency where he was writing a despatch. The sufferings of the besieged were terrible. Deaths occurred from day to day. When, on the 26th of September, Havelock arrived to their relief, of nine officers of the Bengal artillery, five had fallen; 11 ladies and 53 children had been slain, or had died of sickness and privation; and from this time till the 17th of November (the date of the final relief by Sir Colin Campbell) 122 more of the old garrison and 400 of Havelock's men died.

In the adjoining cemetery rests Lawrence. His tombstone bears the following inscription:

Here Lies
HENRY LAWRENCE,
Who tried to do his duty.
May the Lord have mercy on his soul.

One of the best preserved buildings in Lucknow is the Lall Baradari, or public hall of reception of the old native rulers. Now, leaving Lucknow, we continue our journey to Cawnpore, famous for the mutiny days.

In the year 1852, Bajee Rao, the last Peishwa of the Mahratta confederacy, died, leaving all his property to his adopted son, Dhoondoo Punth, commonly called Nana Sahib. The English Government, however, at once announced that though Nana Sahib should inherit the property, the pension and official salute of the Peishwaship would be discontinued. For the next five years the Nana used every effort to change this decree, and smarting under a sense of wrong, he heard of the outbreak at Delhi with joy, and, being on intimate terms with the English, knew that he was in a position to obtain as complete revenge as his long-continued and unnoticed injuries seemed to demand.

On the morning of the 6th of June, 1857, the native troops mutinied and marched out to Kalianpur, the first stage on the Delhi road, evidently with the intention of eventually joining the main body of mutineers.

Sir Hugh Wheeler took his followers, combatant and non-combatant, into a refuge that he had prepared for them in the depot barracks, standing where the new church is now built.

It was now the Nana's turn. Although he had been for the last few years continually petitioning for a restoration of his predecessor's honors, he had always used such tact that the English, so far from regarding him as an enemy, put him in charge, at this critical period, of the arsenal, magazine, park and treasury ! Thus extraordinarily favored by fortune, his revenge was easy. Following the rebels who had departed to Kalianpur, he quickly pursuaded them to return and attack the British at once, instead of proceeding to their fellow mutineers at Delhi. On the very day that Sir Hugh Wheeler entered the entrenchment, the Nana declared his rebellion. Summoning an overwhelming body of natives, he surrounded the little band of Europeans on all sides, and formally opened the siege on the 7th of June.

For three dreadful weeks, the little garrison struggled on. With many sick and dying, without medicine or hospital stores, and short of ammunition, they were subjected to a continual bombardment from without and to hunger and distress within. The brave men, however, did not suffer themselves to be simply besieged. Many sorties were made, and several of the enemy's guns were spiked and

captured. Deaths, however, occurred frequently. Men, women and children sank under the prolonged sufferings; and when, on the 26th, the Nana offered to treat, the survivors accepted the proposition.

It was agreed that the Europeans should depart, under the Nana's escort, to Allahabad, and boats were provided to convey them thither. The picture before you is the scene of the subsequent tragedy. On the morning of the 27th of June, the survivors proceeded to embark. Immediately on the embarkation of the deluded and helpless people, who left the enclosure in the early dawn of the morning, there followed the most dastardly piece of treachery that has perhaps ever been perpetrated. Only a portion of the party had taken their places in the boats when, by previous arrangement, the boatmen set the thatched coverings of the boats on fire and rushed on to the bank. A heavy fire of grape and musketry was then opened on the Europeans. Out of 38 boats, two only managed to start; one of these was shortly swamped by roundshot, but its passengers were enabled to reach the leading boat. Of those on board the other 28 boats, some were killed, some drowned, and the rest brought back prisoners.

How different the scene of the massacre, as it lies before us today! The little temple near the water's edge (near which was the ambush) still sands, riddled with bullets, as if bearing witness to the dastardly deeds; near by, however, are several neat bungalows; the Ganges flows peacefully on its course; and the calm quiet and serenity which seems to pervade the spot are greatly in contrast with the rattle of artillery, the groans of the wounded and dying, and the exultant shouts of the treacherous natives, the remembrance of which will always bring a pang to every civilized nation in the world.

On the site of Wheeler's entrenchment now stands the Memorial Church. This edifice is in the Romanesque style, and is built of brick and stone in the form of a cross, with a tapering belfry at one end. Two tablets in the interior of the church should be mentioned, one for its peculiar sadness, the other for its appropriateness. The first reads: "In memory of Mrs. Moore, Mrs. Wainwright, Miss Wainwright and Mrs. Hill, 43 soldiers' wives and 55 children, murdered in Cawnpore, in June, 1857." The other tablet commemorates

the death of a score of officers and soldiers, and underneath it are the words, "Vengeance is mine, I will repay, saith the Lord."

The last act in the Cawnpore tragedy remains to be told. Of all the multitude that started down the river in boats, four only escaped. The other survivors were driven to the quarters of the Nana. The women and children were placed for the time in a building called the Savada Kotee; the men were shot on the parade ground. About ten days later there was a general move nearer the town. The Nana's triumph was nearly over, and he signalized the close of his power by one of the most frightful acts of vengeance that has ever been chronicled in history. The news of the steady advance of the avenging British was brought to the Nana early in the afternoon of the same day. The Nana and his suite gathered in council to determine what disposition should be made of the prisoners. The matter was soon decided: the captives were to be put to death. At sundown four of the male prisoners were (at the special order of the Nana) taken out and murdered on the high road. Then the general slaughter was begun. Volleys were first fired through the doors and windows of the building where the prisoners were confined, and then the savages, rushing in among the captives with drawn swords, completed the fiendish massacre. At length the work was finished, and the doors were closed. The Nana was living in an old hotel within 50 yards of this house. It is said that he ordered a *nautch*, and passed the night in feasting and revelry. At daybreak he ordered the hall to be cleared. It is estimated that it contained nearly 200 dead bodies. These were stripped, and the majority cast into a well near by. The remainder were hurled into the Ganges.

As soon as order was restored, Lord Canning resolved to erect a memorial on this sad spot. Mr. C. B. Thornhill, at that time Commissioner of the Division (who had lost two brothers in the mutiny), was placed in charge of the work. He was commanded to devise a structure that should protect the fatal well and preserve its site; while the Viceroy, at his own expense, ordered a memorial statue of Baron Marochetti. The result is as follows: on a pedestal built over the well is a large figure of the Angel of Pity. A Gothic wall with iron doors surrounds the premises. Near by is a well-kept

garden. Over the portal of the door is this inscription: "These are they which came out of great tribulation;" and around the well are these words: "Sacred to the perpetual memory of the great company of Christian people, chiefly women and children, who near this spot were cruelly massacred by the followers of the rebel Nana Dhoondoo Punth of Bithoor; and cast, the dying with the dead, into the well below, on the 15th day of July, 1857."

Leaving Cawnpore, we continue our journey to Delhi. Delhi was founded in 1831 by Shah Juhan. We first visit the great mosque of Delhi, the largest in India. It is built on a rocky height to the westward of the palace, and is constructed of white marble and red sandstone, with three domes and two minarets.

It stands in a splendid court-yard, 450 feet square, and is reached by handsome marble steps. The mosque itself is 201 feet long, and 120 feet broad, and 150 feet high. It is said that 5,000 workmen were constantly employed on this mosque for six years. The interior of the mosque contains many beautiful pillars of white marble.

Continuing our way to the left, we enter the exquisite hall of audience, which once contained the celebrated Peacock Throne, worth £6,000,000 sterling, which Nadir Shah took away in 1739. This hall is supported by graceful marble pillars, beautifully inlaid with precious stones in floral designs; and the upper sections, the ceiling, and the cornices are gilt. The room is long and wide, the marble columns are massive and finely wrought, and the decoration is most elaborate. I do not believe it has its equal in the world. The white marble platform on which the Peacock Throne rested is still here. On the cornices at each end can still be deciphered the famous inscription, in flowing Persian characters: "*Ugur furdoosee buroo-i-zumeen ust, humeen ust, humeen ust*" (Oh, if there be an Elysium on earth, it is this, it is this, it is this.)

Next comes the tomb of Nizamooden. This is surrounded by a veranda of white marble, and the sarcophagus is enclosed by a marble screen. At the head of the grave is a stand with a Koran. Not far off is the tomb of Juhanara. The sarcophagus is likewise enclosed by a marble screen. Juhanara was the daughter of the Emperor Shahjuhan. She is said to have been a woman of remarka-

ble talents and virtues. She was the sister of Dara Sheko, heir-apparent to Shahjuhan, who was murdered by his younger brother Aurungzeb, who then deposed his father and proclaimed himself emperor. Juhanara refused to reside at the court of her wicked brother, but remained with her father at Agra. It is believed that she was removed to Delhi and murdered at the command of Aurungzeb. On her tomb are these words, said to have been written by herself :—"Let no rich coverlet adorn my grave ; this grass is the best covering for the tomb of the poor in spirit, the humble, the transitory Juhanara, the disciple of the holy men of Cheest, the daughter of the Emperor Shahjuhan." The top of the grave is covered with a growth of coarse grass. The carved marble screen around it is an exquisite piece of workmanship. We visit next Humayoon's tomb. It was begun by this emperor's widow, Hajee, and completed by his son ; it is said that 200 workmen were employed upon it for 16 years, and that its total cost was 15 lacs of rupees ($750,000). It is built of red stone in the form of a square, with a fine marble dome, and contains a large central hall.

We go now to the Kootub. The literal meaning of Kootub is Polar Star. The tower was begun by Kootub-ood-deen Aibuk, the lieutenant of the Ghorian conqueror of India, towards the end of the 12th century. It was not completed, however, till the middle of the reign of his successor. The tower is exquisitely proportioned. A winding staircase leads up to the top, whence an extensive view may be obtained. The Kootub is a red stone tower 238 feet high, and sloping from a diameter of 47 feet at the base to one of scarcely nine at the summit. A nearer view of a section will give a better idea of this grand work. The three lower stories are surrounded with carved scrolls containing verses from the Koran and the name and praises of the founder.

On our way back to the city we are admitted for a few moments to the great hall where one of the native princes is holding a court reception. The next day we continue our journey to Agra. Agra is situated on the west bank of the Jumna river, 139 miles southeast from Delhi, 906 miles from Calcutta, and 750 from Bombay. It contains a population of 143,000, and has a considerable trade in cotton and salt, which is sent down the Jumna in boats to

Mirzapore and Calcutta. The city was named from *agur*, a salt-pan, much salt having been made in the place by evaporation. It was founded by Akbar the Great in the middle of the sixteenth century.

We begin our day's tour with a visit to Sikundra, the tomb of Akbar the Great. This is a square building of red stone with five stories, the upper one being of white marble, and crowned by four small kiosques. The tomb was built by Juhangeer, the son and successor of Akbar. It is said to have cost 15 lacs of rupees. A beautiful garden surrounds it, full of orange, banana, tamarind, mango, palm, and peepul trees. A high red stone wall encloses the grounds, with a lofty gateway in the centre of each of its sides. On the summit of the mausoleum is a white marble sarcophagus, exquisitely sculptured, and placed in the centre of a large chamber open to the sky; 99 titles of the Creator are on the tombstone, and at the head and foot are the salutations of the school or faith of Akbar, "Allaho Akbar! Jilli Julali Hoo!" The real tomb which covers the remains is in a vault below the floor of the building. The hall is about 38 feet square, and the ceiling is of blue and gold plaster. Stand at a little distance from the building, opposite the main gateway; from here one can appreciate the beauty of the whole. On either side of the wide stairway are two minarets. The different red stone stories rise one above another, surmounted by the beautiful chamber of white marble; at each corner of the upper terrace are two marble turrets with gilded domes, which flash and glitter in the sun; around us is the luxuriant garden, filled with bright sunlight and patches of shade, while a deep and impressive silence pervades this abode of the dead.

We next visit the fort situated in the town. This is a lofty structure of red stone, with walls about 70 feet in height and a mile and a half in circumference. The fort was captured by Lord Lake in 1803.

The Motee Musjid, or Pearl Mosque, is the most beautiful building on the premises. It is of white marble, standing on a lofty sandstone platform, and has three delicate domes of white marble. Bayard Taylor says: "It is a sanctuary so pure and stainless, revealing so exalted a spirit of worship, that I felt humbled as a Christian

to think that our noble religion has never inspired its architects to surpass this temple to God and Mahomet."

From here we drive to the Taj. Arrived at the premises, we pass through a splendid gateway of sandstone, covered with inscriptions from the Koran in white marble. Proceeding, we enter a beautiful garden with rich trees, shrubs and flowers, and many fountains. At the farther end, above the rich foliage, rises a marble building of dazzling whiteness. Its proportions are so graceful that it seems to be but lightly resting on its foundations, and its dome is so delicate that it is almost transparent. We approach nearer, ascend some white marble steps, and reach a white marble platform. Crossing this, we arrive at the door, a gem of delicate carving and tracery. We descend into the vault containing the sarcophagi of Shah Juhan and his queen, Moomtaz-i-Mahal (The Light of the World). The tombs are exquisitely adorned with bloodstone, agat, carnelian, and jewels, inlaid with great taste. They are surrounded with an octagonal screen of marble, covered with different designs worked with precious stones. The roof and walls of the chamber are pure white blocks of marble, and the echo that is returned here is wonderful. I have seen many different buildings, many handsome structures, many varied styles of architecture; never have I beheld one which surpasses this Taj Mahal.

We must now leave Agra and continue our journey to Bombay. On our arrival we drive through the fine esplanade. Bombay is distant 1,417 miles by rail from Calcutta, and 775 miles from Madras. The English obtained the place as part of the dowry of the Princess Katherine of Portugal, when she was married to Charles II. This monarch ceded it to the East India Company in 1669. It contains a population of about 700,000, and carries on an extensive trade. The city now contains many handsome buildings, wide streets lighted with gas, and a horse railroad. It is excellently drained; and Malabar hill, overlooking the town, is covered with picturesque bungalows. Multitudes of Parsees, with tall black paper hats, are constantly seen on the streets. They are thrifty and industrious, and many of them have amassed large fortunes. Not far from here is a statue of Queen Victoria.

Having engaged a small steam launch, we start about seven o'clock

for the Caves of Elephanta, situated on Garapuri island, about eight miles from Bombay. This is a specimen of the numerous cave-temples found in various parts of India. Here we see large chambers hollowed out of the rock, regular rows of sculptured pillars, and rude statues of various divinities. The chief object of interest in Elephanta is the Hindoo Trinity, an immense head with three faces, cut out of a single piece of rock, representing Shiva, Vishnu, and Buddha.

We must now bid farewell to India and cross the Arabian sea to Aden, which is situated on a rocky peninsula near the entrance to the Red sea. It is owned by the English, and would be an important naval station in case of war. It has a population of about 21,000, the majority of whom are natives. A small trade is carried on with the interior of Arabia and with the opposite ports in Africa.

Continuing our journey after a week's run up the Red sea, we disembark at Suez and cross the desert on a railway to Cairo, distant 224 miles. Cairo (Italianized from El Kahirah, The Victorious) contains a population of 375,000, of whom 20,000 are foreigners. The Khedive has greatly improved the city, and the European quarter contains many handsome residences, hotels, a public garden, and a fine opera-house. The Citadel is the largest mosque in Cairo, built on the highest ground in the city. This mosque was founded by Saladin in 1176, and its domes and minarets can be seen from almost every part of the city. We will take a nearer view of the Citadel mosque, and now will enter to inspect the interior. As we proceed through the streets of the city we pass a native—one of many—who perambulates the streets with a rude arrangement for laying the dust—a goat's-skin filled with water. Then a Ghawazee, or dancing woman, walks slowly by, her nails dyed with the much prized *henna*. Then we meet a native lady wearing the *yashmak*, or veil. Continuing our way, we visit the mosque of Emir Akhor, and then go to the mosque of Kait Bey. We pause a moment to inspect the courtyard of the palace of the Khedive. Soon after we set out for the Pyramids and Sphinx. We have not proceeded far, when we come to a curious Arab cemetery. The distance from Cairo to the pyramids is about 10 miles. The Khedive has built

a broad and good road thither, and travelers generally take barouches to accomplish the journey. At last we reach our goal. Having arrived at the foot of the Great Pyramid, we are obliged to parley with an old Arab sheik, who—for what reason no one seems to know—enjoys a sort of royalty from every traveler who ascends to the top. Having promised the sheik that his demands shall be attended to on our return to earth, and having selected four of the frantic multitude who surround us, we are marched in triumphal array towards Cheops, two Arabs in front dragging each of us along, while two more follow close behind, in readiness to push us up on to the enormous blocks of stone of which the pyramids are composed. Mark Twain well says that each stone "is as large as a dinner-table;" and it actually takes the combined exertions of the four Arabs, pushing and pulling, to get the visitor to the top.

Not far from the Great Pyramid is the Sphinx. I know a gentleman who said that as he stood beneath this great monument and gazed on its face, he was so impressed with a feeling of wonder, akin to awe, that he actually *wept*. No such emotion was excited in my breast. The figure is so mutilated that it is difficult to determine justly what its appearance may once have been. On our way back to Cairo we pass a *dahabeyeh*, or Nile boat, about to start with a party up the Nile.

Again we must take the cars, and after a journey of a few hours we reach Alexandria. Pompey's Pillar, so called—a plain shaft of red granite, 68 feet in height and 9 feet in diameter at the bottom—is about the only monument here to be seen.

Embarking again, we cross the Adriatic sea to Italy, and stop first at Sorrento, and here we find the peculiar type of peasant women who inhabit the town. Thence on to Naples. Vesuvius is active, as usual. We visit Pompeii, and roam through its deserted and quaint streets. We see in the museum the terribly realistic portraiture of one of the former citizens of the buried city, who was suffocated with the ashes.

Thence on to Rome. We visit the Forum and the Colosseum, and the vault of the Church of the Capuchins, adorned with the remains of the old dead monks of the order. Then we press on to *La Belle Firenze*, or Florence, with its beautiful David and its lovely Venus of Canova. We stop for a few hours at Pisa to see

its leaning tower, and then proceed without further delay to Venice. We glide over the Grand canal in a gondola, and we visit the famed St. Marks. Then we take the train to Milan to see its beautiful cathedral. And thence we are carried to Paris. And from here we take our direct departure for America. In ten days our dear country comes in sight. Boston rises before us. We have traveled around the world and reached our home in safety.

ARCTIC EXPLORATION.

BY

THE REV. B. F. DE COSTA.

At an early period navigators directed their enterprise towards the north. Encouragement to explore a region invested with mystery and romance was found in the fact that great currents, both in in the sea and the air, were ready to serve as guides and help them on their way. Nature appears partial towards the north, as the equator of heat is by no means coincident with the equatorial line In portions of the Pacific the equator of heat indeed runs south of the geographical equator, but elsewhere it sweeps ten degrees north of the line, and from thence hot waves are thrown off towards the pole. When battling his way towards the high latitudes, man acts in sympathy with the mightiest forces of nature. The magnetic needle, pointing steadfastly towards the north, is the index of his mind. This joint tendency of nature and man is prophetic and tells of a triumphant result.

When or under what circumstances the first arctic voyage was made is not now known. At the dawn of history, the northern regions were represented as the realm of perpetual night. There, upon the border of a vast sea, the Cimmerians dwelt in the congenial gloom, their habits forming the theme of grotesque fables. The earliest maps, however, show the polar regions as occupied by a watery waste, while there are few statements that come to us from that early period which are more definite than that of Scymnus of Clio, who flourished about 900 years B. C., and who says, in his Fragments, "that at the extremity of the Celts is a boreal peak ; it is very high and sends out a cape into a stormy sea."* Letronne thinks that Σκηλη is a poetical expression, indicating some mountain chain, whose peak performed the same office in the north that was filled by Etna in the south, Caucasus in the east, and Atlas in the west.

* "Fragments des poemes Géographiques de Scymnus de Clio," &c. By M. Letronne (p. 66).

The earliest voyage to the north is that claimed for Pytheus, the distinguished Phenician astronomer and geographer of Marseilles, who flourished 320 B. C. His works were extant in the fifth century, but are no longer found. Pliny and Eratosthenes gave full credit to his narrations, though Strabo shows great hostility to Pytheus, whose accounts he refused to receive, saying that he made "use of his acquaintance with astronomy and mathematics to fabricate his false narrative."* Pliny, however, with more reason, thought that he employed his knowledge in practical exploration. The latest editor of Strabo does not share in his author's doubt. According to Pliny and others, Pytheus sailed through the Straits of Gibraltar, making his way north to the British isles, whither it was the custom of his countrymen to resort, and, after traveling over England on foot, proceeded northward to a place called "Thule," six days' sail from the northern part of Britain.† Strabo points out serious errors in his account of England, but the errors in the main may be attributed to transcribers; by whom Timœus is made to call Vectis, the Isle of Wight, "Mictis," and put it at six days' sail from Britain. In Pliny's time those regions were well known, and he speaks of "writers who make mention of some other islands—Scandia, namely, Dunna, Bergos and, greater than all, Nerigos, from which persons embark for Thule. At one day's sail from

* Strabo, B. VII. c. 3, 1.

† Pliny, Nat. Hist., B. II., c. 75; and B. IV., c. 13, 30, 36. Strabo says: "It is true that Pytheus of Marseilles affirms that the farthest country north of the British islands is Thule, for which he says the summer tropic and the arctic circle is all one. But he records no other particulars concerning it, whether Thule is an island, or whether it continues habitable up to the point where the summer tropic becomes one with the arctic circle." (B. II., c. v., 8.) Strabo's editor says on this, that the summer tropic being placed at 24 degrees from the equator by Strabo, and most probably by Pytheus, the latitude of Thule or Iceland would be fixed at 66° N., which corresponds with the north of Iceland, where the two tropics would join and become one. To the foregoing may be added another criticism on Strabo, which has an effect opposite to that intended, as the "marine sponge" is nothing but the soft ice which forms in the north. "It is likewise he who describes Thule and other neighboring places where, according to him, neither earth, water nor air exists separately, but a sort of concretion of all these resembling marine sponge in which the earth, the sea, and all things were suspended, thus forming as it were a link to unite the whole together. It can neither be traveled over, nor sailed through." (Book II., c. iv., 1.)

Thule," he adds, "is the frozen ocean, which by some is called the Cronian sea."*

There has been a division of opinion respecting the locality of the place forming the point of departure for Thule, or Iceland. By some, Scandia is identified with Scandinavia, Bergos with the modern Bergen, and Nerigos as the northern part of Norway, though Gosselin is of the opinion that Bergos refers to the Scottish island of Barra, and Nerigos, to one of the northern promontories called "Nery." However this may be, it is evident that, in the time of Pliny, and long before, there were those who knew of the island of Iceland, which was reached either from the Orkneys or from the coast of Norway. We incline strongly to the latter opinion, as Bergen, in Norway, from time immemorial, has been a point of departure for Iceland.

While the classic geographer knew much about the north, it is also reasonable to infer that the waters of the sea towards New Foundland had been frequented by Europeans engaged in the fisheries, and that, by degrees, they sailed to the coasts of Greenland and America. It is true that Iceland appears to have been generally unknown to the Scandinavians until the year 864, but the people of Great Britain were well acquainted with that lonely isle long before.

The earliest known movement northward from England was that inaugurated by King Arthur, about the year 505. The authority on this subject is Geoffrey of Monmouth, who was bishop of Saint Asaph in 1152, and who wrote the *Historia Britonum*, a work which afforded a basis for the fables and romances of the "Knights of the Round Table." Nevertheless, whoever inclines to turn from all the statements of Geoffrey, for the reason that they contain much that is untrue, should ponder the well-considered words of Hume, who says of the Prince of Silures: "This is that Authur so much celebrated in the songs of Thaliessin and the other British bards, and whose military achievements have been blended with so many fables as even to give occasion for entertaining a doubt of his real existence. But poets," he continues, "though they disfigure the most certain history of their fictions, and use strange liberties with truth, where they are the sole historians, as among the Britons, have commonly

* Pliny, B. IV., c. 30.

some foundation for their wildest exaggerations."* The Bishop of Saint Asaph, who was not a poet, may be credited, therefore, when he states such simple facts as that, about the year 505, King Arthur, after the conquest of Ireland, received the submission of the Orkneys and sailed to Iceland, "which he also subdued;" at a subsequent period overcoming his foes in Norway.† The conquest of Ireland cost much bloodshed, but that of Iceland, if he went there, must have been made without a struggle, since at that period there could not have been men enough to make any great resistance.‡

Hakluyt, treating this matter, quotes from Galfridus Monumetensis, who says that, after subduing Ireland, Arthur went to Iceland, and "brought it and the people thereof under his subjection."§ The same author mentions "Maluasius" as "King" of Iceland, and tells of soldiers that he furnished.‖ The "King," however, may be reduced to a figure of speech, while there could have been no soldiers, unless, indeed, Arthur, as elsewhere stated, transported people to the north. Hakluyt also quotes Lambord, to the effect that Arthur made his way to Greenland;¶ but we can understand how the statement originated, since the map of Ptolemy made Greenland a western extension of Norway, the position of the country being misunderstood. It was very easy, therefore, for modern chroniclers to suppose that Arthur took Greenland on his way in his expedition to Norway; hence this error.

Waurin, who wrote in the 14th century, before the influence of Ptolemy's maps was generally felt, does not mention Greenland, though he says that Arthur carried the war into Iceland and fought with the Icelanders, whom he brought into subjection.**

Geoffrey of Monmouth does not allude to Greenland. Nevertheless, he is our authority for the statement that Arthur went to

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* Hume's England, I., p. 38. Ed. 1822.

† Geoffrey's History, B. IX., c. 10.

‡ In the year 970, voyagers from Iceland found money on an island at the west. See "Pre-Columbian Discovery of America by the Northmen." Munsell, 1868, p. 14.

§ Navigations, I., 1. ‖ *Ibid*, I., 2. ¶ *Ibid.*

** In Chroniques, I., Lib. III., c. xix., p. 370, we read; "Et puis transporta le Roy Artus sa batalle en yrlande ou parevillement il se combaty et victorya les Islandais et myst en sa subjection."

Iceland. It is possible that the Bishop of St. Asaph *inferred* that the northern island visited was Iceland, and it is also possible that, in such a case, he may have been in error ; but this treatment of his statement is not required. That Arthur could have sailed to Iceland, admits of no doubt ; nor is there any reason for holding that there were no inhabitants there in 505. The fact that the Northmen found only a few monks in Iceland in 864, does not prove that the same was true 250 years earlier. Bede, who died in 725, knew of Iceland ;* and the Prologue of the *Landnamabok* speaks of both Irish and English books found there when the Northmen arrived.† Dicuil teaches that monks were in Iceland in 795 ; for, writing in 825, he says that thirty years had passed since some clerks (*clerici*), who had dwelt in the island, told him certain things. He also says that those who in their writings had described Iceland as surrounded by a sea of ice were quite wrong, and he proves the truth of his own account by the testimony of "clerks who had voyaged to this island." He admits, however, that in voyages to the *north* of Iceland "they have found the sea frozen."‡ Dicuil also testifies that there are numerous islands two days and two nights to the north of Britain, and that a "Religious, worthy of faith," told him of a visit made by him in a small boat to one of these islands, which nearly a hundred years before was inhabited by Eremites, from Scotland. But Dicuil says that these regions were abandoned on account of the ravages of the northern pirates, who were as innumerable as "the birds of the sea." Thus it appears that Iceland was well known to the people of the British isles long before it was inhabited by men from Norway, and we can readily understand how the population that probably existed in Arthur's time may have been reduced by piratical incursions, until, in 864, the Norwegians found only a few anchoretes dwelling there. The narrative of Geoffrey of Monmouth is, therefore, perfectly consistent with known facts, and the expedition of Arthur to Iceland may be regarded as historic.

It is now apparent that, in the century before Dicuil dated his

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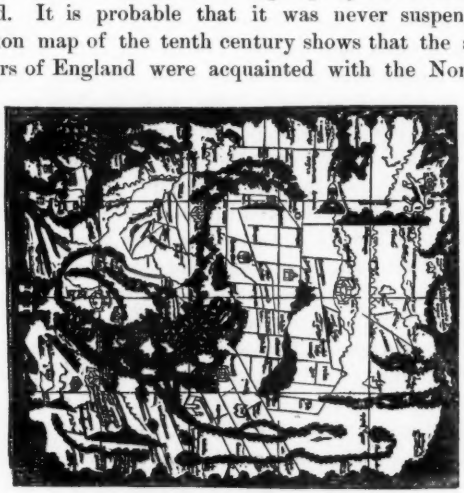
* *Antiquitates Americanæ*, p. 202.

† *Ibid.*, 205. *De mensura Orbis Terræ*, Letronne's Ed., p. 38.

‡ *Ibid.*

book, the British islands were in communication, and chiefly through the medium of the monks, who, as is well known, were bold and skillful sailors, pushing far out to sea in boats of wicker or hide. How long this communication was kept up by them cannot now be determined. It is probable that it was never suspended. The Anglo-Saxon map of the tenth century shows that the sailors and geographers of England were acquainted with the Northern sea.



The Anglo Saxon Map.

Beyond Iceland was the open sea, into which Dicuil's informants, the Religious, whom he styles "clerks," had so boldly sailed, until they reached the barrier of ice which bars the course of the explorer to-day.

We have already seen that Arthur did not visit Greenland, yet that that part of the north was reached about the time of Arthur, admits of little doubt. It is true that the discovery of Greenland has generally been assigned to the period of Eric the Red, who went to Greenland in 985, yet a Bull of Pope Gregory IV., dated 770, refers to Greenland. The genuineness of this Bull cannot be questioned, nor is there any reason to suppose that the reference to Greenland was interpolated. The Bollandists may indeed think that there is some mistake,* but the explanation is easy and natural,

* This is a matter of private information, but the author cannot learn that the

when we take into consideration the known activity of maritime enterprise prior to Eric the Red. Indeed, the Irelandic chronicles distinctly say that, half a century before the voyage of Eric, a great country was known at the west, being called "Ireland the Great." It would seem that this country was first reached by the Irish, whose prior discovery was conceded by the Icelanders. The Irish had described it, evidently, as a land of verdure, while the Saga says that Eric applied the name of "Greenland" to the part he visited, not from any fitness, but from motives of policy, saying that "men would be persuaded to go to a land with so good a name." It is nowhere pretended that the name "Greenland" originated with Eric. His own account indicates that Europeans had visited Greenland before his time, which leads to the conclusion that the Irish had been in the country, and that the reference to Greenland in the Bull of 770 is correct.*

In the year 1187, Giraldus Cambrensis wrote his *Topographia Hibernica*, and in this work he speaks of Iceland, which is described as a great island three days' sail northward from Ireland. The people are represented as of few words, but truthful. Giraldus shows that he understood something of the nature of their government, in saying that their priests were their kings.†

Approaching the thirteenth century, the age appears to be one of maritime activity. Necker, Abbott of Cirencester, who died in 1217,

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Bollandists have any acquaintance with the general subject which would give weight to any opinion they might entertain.

* On this point, see "Pre-Columbian Discovery of America by the Northmen," p. 85, and "Antiquitates Americanæ" on the Minor Narratives.

† "Est et yslandia borealium insularum maxima; trium dierum naturalium navigatione in aquilonares partes ab Hibernia remota. Gentem hæc breviloquam et veridicam habet. Raro namque brevique fungens sermone, juramento non utitur; quia mentiri non novit. Nihil enim magis quam mendacium detestatur. Gens hac eodem ititur rego quo sacerdote; eodem principe quo pontifice. Penes enim episcopum tam requi quam sacerdotii jura consistunt. Hæc terra girofalcones et accepitres grandes et generoses gignit et mittit. Nunquam hic aut rarissime vel coruscant fulgara vel cadunt tonitrua. Sed habent e contra pestem aliam, et longe mojorem. In anno nanque semel, vel biennio, per aliquam insulæ partem ignis emergens, in modum turbinis cum vehementia spiritus excurrens, quicquid obviam offendit funditus exurit sed ignis iste unde causaliter vel infra vel desuper ortum habeat incertum habetur."—Distinctio, I., c. xiii., p. 95.

was acquainted with the use of the compass.* In the fourteenth century, Barber said of the party accompanying King Robert of Scotland from Arran to Carrick, "they na nedil had na stane," showing that those things were familiar to navigators. Here, therefore, it will be necessary to introduce Nicholas of Lynn, who, in 1360, made a voyage to the high north. But before attempting the particular consideration which seems to be required, it will be necessary to glance at the condition of northern maritime enterprise during the fourteenth and fifteenth centuries. In the fourteenth century the fisheries were commonly pursued around Iceland, whose people were in regular communication with Greenland. The English also must have known of Greenland at the time, though, in common with the people of Iceland and Norway, they did not appreciate the importance of this knowledge. In the fourteenth century, proof is found both in the Icelandic and English annals of the connection between the two countries. The Icelandic contains indications of the arrival of English ships, but it is clear that their coming was so well known as to gain only a casual allusion, the interest standing connected with the news brought. The entries were made at the time, having since been extracted from the numerous writings for the convenience of students, and set down in chronological order in the language of the original. Let us, therefore, notice these entries.

In 1348, news reached Iceland that in England the mortality was so great that 200,000 persons had died.† The next year the death of English sailors at Bergen, in Norway, opposite Iceland, was reported, and recorded in the Sagas.‡ This is all that we find at present in connection with the fourteenth century in Iceland; but the reference of the Saga to the great mortality in England is confirmed by Stow's "Annales," which state that the plague reached England in 1348, touching the seaports first. Thence, no doubt, the news was at once carried by fishermen to Iceland.§ If the voyages of the

* Bulletin de Géographie 1858, p. 177. Are Frode, in 1068, speaking of the visit paid to Iceland by Floke Vilgerderson, says that in those times seamen had no loadstone in the northern countries. The Bible Guyot, 1150, speaks of the loadstone as "un pierre laida et brunniere."

† "Islenzkir Annálar," Hafniæ, 1847, p. 276. The Icelandic is as follows: "Mannfall ógurlegt á Englendi svâ at tvö hundred thousand datt nidr."

‡ *Ibid.*, 278.

§ Stow's "Annales," p. 245, Ed. 1631.

English to Iceland had possessed greater interest, there would have been some more definite notice in the Sagas. We are free, however, to admit that, early in this century, the merchant trade may have been small, as in 1328 Edward III. does not mention Iceland in his "*Pro Mercatoribus Extraneis.*" Nor does he mention Denmark or Norway, but these are included in the general language, "*omnium aliarum Terrarum et locorum extranorunt.*"* Nevertheless, the mandate of Edward III., dated March 18th, 1354, recognizes the fact that the king maintained a fleet for service in the "parts Boreal," John de Haddon being the Admiral.† It was probably designed to protect the fishermen and merchants from pirates around the north of Britain.

In the Icelandic annals of the fifteenth century, the first entry is that of 1407, when news was received of the death of the Archbishop of York.‡ In 1412, it was recorded that five English sailors had separated from their ship and wintered in the island.§ In 1413, "thirty more fishing vessels came from England." Some of them were blown to the northern part of Iceland, and possibly to the Greenland coast.‖

In 1415, six English ships sailed to Iceland, and made their port in the Westmann Islands.¶ In 1416, six ships anchored in Hafnafiord, in the southwest of Iceland.** In 1419, many English ships were wrecked on the coast of Iceland, and a large number of lives were lost.†† The annals, in the present compilation, end with the year 1430, and these six entries are all that we find. If carefully considered, however, it will appear that these mentions really form *memorabilia.* This will be seen by turning to the English annals for the corresponding period. The first reference to Iceland in the *Fœdera* is that of 1415, when Henry V., for the satisfaction of the King of Denmark, ordered that during the year none of his subjects should presume to visit any of "the coasts of the islands belonging to Denmark and Norway, and especially to the island of Iceland," for the purpose of fishing or trading, "otherwise than according to the ancient custom" (*aliter quam antiquitùs fieri con-*

* Rymer's *Fœdera*, iv., 361.
† *Ibid.*, v., 778.
‡ *Annálar*, p. 382.
§ *Ibid.*, p. 386.
‖ *Ibid.*, p. 388.
¶ *Ibid.*, p. 390.
** *Ibid.*, p. 392.
†† *Ibid.*, p. 394.

suevit."* This notice was served upon the authorities of the various seaports of England, the mayor and bailiff of Lynn, Norfolk, being notified with the rest. Here, then, we learn, in connection with 1415, that in the ancient times voyages to Iceland had become frequent. It is clear from the complaint of the Danish king that the old rules respecting traffic had been broken habitually, and that they were now to be observed, at least for one year. Of the exact nature of the ancient law we cannot speak, but it would appear as though the prohibition related to the shore fisheries, which they were not to intrude upon, and hence, when the English went to Iceland, in 1415, they harbored off the coast at the Westmann Islands. The arrival of the ships, under the circumstances, formed a noticeable event, and for this reason it was recorded. The Icelandic Annals add, immediately after mentioning their arrival, that "the ships brought letters from the King of England to the people and the chief men of Iceland, to the effect that license should be accorded to transact business, and especially that relating to the king's own ship." The Annals state that the matter was duly arranged. It will be noticed, too, that one of these ships belonged to the King of England. It was evidently a cruiser of the royal navy.

There is, then, a complete agreement between the English and the Icelandic Annals, both showing that an English fleet visited Iceland in 1415—a circumstance which should go very far to establish the general value and credibility of those records of a distant age.†

In 1416, the English were again in Iceland, but the *Fœdera* does not mention voyages until 1436, when Henry VI. issued a license to John, the Icelandic Bishop of Holem, then in London, authorizing him to engage John May, with his ship "Catherine," for a voyage to Iceland, where May, evidently an old voyager, was to act as his attorney, and transact certain business for him, the Bishop himself not wishing to undertake the voyage.‡ In 1436, Richard Weston, of London, a "stockfishmonger," was well known by the Icelanders.§

* *Fœdera*, ix., 322.

† This agreement between the English and Icelandic authorities appears to be pointed out now for the first time.

‡ Fœdera, x., 645 and 659. Ed. 1877.

§ *Ibid.*, x., 762. These supplies were sent to the Bishop of Skalholt, who alone was authorized by the Synod of Denmark to supply the elements of the sacraments to the churches. See "Kirchengefchichte von Danemark und Norwegan" (Münter), III., 16.

In 1440, Henry VI. sent two ships to Iceland, with supplies to be exchanged for such commodities as the inhabitants possessed. It was feared that without this aid from England, the sacraments even would be omitted, there being neither wine nor salt in the country, and only milk and water (*lac et aquam.*)*

In connection with the year 1445, another voyage is indicated by the Admiralty Black Book, action having been taken against William Byggeman, and two men of Lynn, who visited Iceland in a "dogger," called the "Trinity," and kidnapped a boy whom they brought to Swetesham and held in servitude, contrary to law. †

In 1450, a treaty was made between the Kings of Denmark and England, which prohibited trading in Iceland; but a special provision of Parliament exempted Thomas Canynges, Mayor of Bristol, from the prohibition, in consideration of his great services to Iceland. He was accordingly allowed to send two ships thither to load with fish or other commodities. His trade with Iceland was a matter of general knowledge, and throws additional light upon a certain remark by Columbus.

To avoid interrupting the course of the narrative respecting Iceland, allusion to the voyage of the Zeno Brothers was omitted in its proper chronological place. This voyage was made to Greenland, and a part of the American coast called Estotiland, and Drogeo; but it is not desirable to dwell upon such a familiar theme here. It suffices to say, whatever may be the obscurity of portions of the narrative, that its authenticity never would have been questioned, if it had been understood that at the time the voyage was made the seas at the north and west were well known and frequented, of which fact ample proof has now been given. The Zeno Map, published with the narrative in 1558, shows that the Zeno family had a knowledge of Greenland that could have been obtained only during the pre-Columbian times. ‡

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* *Ibid.*, x., 645.

† "Item quod Willelums Byggemane de Suetesham magister cujusdem navis vocatæ le Trinyte, dictæ vulgariter dogger, Johannis Pigot et Henrici Sorysbi de Lenna Episcopi, circa festum Exultacionis Sanctæ Crucis anno dicti regis vicesimo tertio, cepit unum pueram in partibus de Islandia, et ipsum duxit in dictu navi ad ibidem usque Suetesham, adsibi serviendum, contra statuta regia in hoc parte facta." —*Monumenta Juridica* (Black Book), I., 273.

‡ On Zeno, see "The Sailing Directions of Henry Hudson," p. 5; "The North-

In this connection the investigator must not overlook the voyage of Skolnus the Pole, which took place in 1476. Hakluyt says that this voyage is mentioned by Gemma Frisius and Girava.* It is certainly referred to on an ancient globe of about 1540, preserved in Paris, and known as the Rouen Globe, whereon, near the northwest coast of Greenland, is a legend declaring that Skolnus reached that point in 1476. This globe seems to antedate Gomara (1553), the earliest author that the writer has been able to consult.

Next, attention should be directed to the voyage of Columbus, of which the Genoese himself gives the following account:

"In the month of February, 1477, I sailed a hundred leagues beyond the island of Thyle, the southern part of which is distant from the equinoxial 73 degrees, and not 63, as some wish it to be; nor does it lie upon the line where Ptolemy's west begins, but much more toward the west. And to this island, which is as large as England, the English come for traffic, and especially those of Bristol. And at the time I was there the sea was not frozen, but in some places the tide rose 26 fathoms [feet], and fell the same."†

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men in Maine," p. 30. Also a full discussion of the subject in the Hakluyt Society's edition of the voyage, edited by Major.

* Hakluyt makes his reference in a general way, giving neither chapter nor page. Frisius published "De Principius Astronomiæ & Cosmographiæ," &c., in 1530. The "Cosmographaiæ" of Hieronimo Girava was printed 1556. Gomara mentions Skolnus in his "Historia," c. xxxvii., Ed. 1553. See "The Sailing Directions of Henry Hudson," p. 23, in connection with Wytfliet and Pontanus. For Hakluyt, see Maine Coll., S. 2, Vol. II., p. 148.

† The Italian runs as follows; "Io navigai l'anno 1477. nel mese di Febraio oltra Tile isola cento leghe, la ciu parte Australe è lontana dall' Equinottiale settantatre gradi, et non sessantatre, come alcuni vogliono: ne giace dentro della linea, che include l'Occidente di Tolomeo, ma è molto piu Occidentale. Et a quest' isola, che è tanto grande come l'Inghilterra, vanno gl'Inglesi con le loro mercatantie, specialmente quelli di Bristol. Et al tempo, che io vi andai, non era congelelate il mare che in alcuni luoghi ascendena ventesi braccia, et discendena altro tanti in altezza." (Historia del S. D. Fernando Colombo, 1571, c. iv.) "Braccia" is evidently a clerical error, as the original Spanish will doubtless show, if ever found. That Columbus was familiar with the map in the Ptolemy of 1486, showing the northern regions, with Greenland as an extension of Europe, can hardly be doubted. His remark respecting Thyle appears to be intended almost as a correction of this map, on which the Orcades and Thyle are laid down north of Scotland, Thyle being in 63° N., while it appears again further north as "Islandia." This double representation of Iceland on the map was a blunder, that island being laid down first according

Whoever wrote the life of the Admiral, there is no question but that he made the voyage. Finn Magnussen has pointed out an interesting confirmation of the statement of Columbus respecting the mild weather in 1477, where he shows, from the annals, the remarkable fact that in 1477 snow had not been seen at Eyafjord, in the north of Iceland, as late as March.†

To this period belongs the voyage of Robert Alcock, of Hull, who, in 1478, was commissioned by Edward IV. to send a ship of 240 tons to Iceland, which was "to reload with fish or other goods."‡ He was licensed again in 1483.

Chaucer, in the prologue to the Canterbury Tales, shows by his "Shipman" something of the activity of the British sailor in the time of Nicholas of Lynn. It is said that,

> "Of nice conscience toke he no kepe,
> But of his craft to recken wel his tides,
> His stremes and his strandes him besides,
> His Herberwe, his mone, and his lodemange,
> Ther was non swiche from Hull unto Cartage;"

while

> "He knew wel alle the havens, as they were,
> Fro Gotland to the Cape de finistere."

An indication more to our present purpose is found in the poem on "the Policie of Keeping the Sea," which belongs to the middle of the 15th century. At that time the northern region was so well known that the author of the poem disposes of the subject briefly:

> "Of Island to write is little nede,
> Save of stockfish; yet forthsooth, indeed,
> Out of Bristowe, and *costes many one*,
> Men have practiced by needle and stone

to Ptolemy, and then according to the prevailing ideas of the day. This peculiarity of the map entitles it to interest as a Columbian map, though the feature referred to does not appear to have been remarked upon hitherto.

† The fact was produced from the Annals by Finn Magnussen, in "*Nordisk Tidskrift for Olkyndighed*," Vol. II., p. 129. It has been suggested, though without reason, that the voyage of Columbus was made in 1467. See Barrow's "Chronological History," p. 26. Columbus gives the wrong latitudes for the places visited, but this may be the fault of the editor; while Humboldt says that they were not the result of his own observations during a rough wintry voyage. See *Examen Critique*, II., 115, and V., 214, *n*. In 1550 a Bristol ship was lost at Iceland. See Barrett's Bristol.

‡ Fœdera, XII., 94.

> Thider wardes within a little while
> Within twelve yere, and *without perill*
> Gon and come, *as men were wont of old*
> Of Scarborough unto the costes cold."*

Thus, at the time when the poet wrote, Bristol had revived her old enterprise. The maritime enterprise of this period is greatly underrated by Mr. Froude.

The sketch thus given of maritime enterprise towards the north, and especially during the 14th and 15th centuries, is quite general. It would be easy to swell the citations from various sources, among which may be mentioned the voyages to the west of Ireland so well known to Columbus, as his biography proves. Yet enough has been said to show the real character of the period in which Nicholas of Lynn flourished. The times, both before and after the general date assigned to his voyages, were marked by great activity, and expeditions to the north were so common that neither the English nor the Icelanders took the trouble to mention them, except when they stood connected with circumstances of particular interest. The intercourse between Iceland and England was so frequent that sailors like John May, who served as the representative of the Bishop of Holem, must have acquired a fair knowledge of the language spoken in that distant isle. Indeed, at one time, under the Normans, the Icelandic tongue gave a person the advantage at the courts of both England and France.†

But enough has been said to prove that the voyage of Nicholas of Lynn, in 1360, formed no novelty. It was the alleged circumstances attending his voyage that rescued his name from oblivion. His actions take their place with entire naturalness in the annals of his age, there being nothing in the nature of the voyage towards the Pole to challenge belief. But it will be proper here to speak of Nicholas himself.

Quaint Andrew Fuller, in his Worthies of England, says that no county "doth carry a *top* and *gallant* more high" in maritime affairs than Norfolk; and, in speaking of the seamen, bids "none be offended if a friar be put in front of all the rest." The friar alluded to was Nicholas of Lynn.‡

* Hakluyt. Vol. I., p. 201. Ed. 1599–1600.

† Laing's Heimskringla, Vol. I., chap. viii., p, 61.

‡ After writing the greater portion of this paper we chanced to find two other men

This individual was born in Lynn, Norfolk, at the end of the thirteenth century, or at the beginning of the fourteenth. Of his ancestors nothing is known, and but few of the particulars of his life are now accessible. Richards, in his history of Lynn, has made some statements that relate to certain points, but we are unable to say how far they may be verified. It is nevertheless certain that Nicholas was a navigator and a laborious student, and that he resided for a time at Oxford. He was well known by Chaucer, who, in his treatise on the Astrolabe, speaks of him as "Frere N. Lenne," a "reverent clerke."* Bale says that he excelled in arithmetic, geometry, music and astrology ;† and it is a curious fact that the Nicholas of Chaucer's "Miller's Tale" is represented as possessing the same acquirements. Chaucer also makes him a student at Oxford, calling him "hende," or handsome Nicholas, and surrounding him with the implements of his profession :

> "His almageste [Ptolemy] and bokes grate and smale,
> His astrolabre, longing for his art,
> His augrim stones, layen faire aparte,
> On shelves couched at his beddes hed,
> His press ycovered with a falding red.
> And all about there lay a gay sautrie
> On which made on nightes melodie,
> So sweetly that all the chambre rong :
> And angelus ad virginem he song."

The "Miller's Tale" also indicates the possession of certain nautical tastes on the part of the hero, and the device of the Tub may have been intended as a playful allusion to some attempted navigation by Nicholas of Lynn. It is possible, therefore, though Chaucer speaks of him with much respect in his work on the Astrolabe, that,

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of the same name, though neither of them appear to have attracted the attention of those who have written on the antiquities of Lynn. First, "Nicolas de Len," Abbot of St. Albans, in 1255, who made a visit to Rome. He is referred to in the "Grande Chronique de Matthieu, Paris," T. IV., pp. 89-100. The second is Nicolaus Prior of Lynn, who entertained John Alcock, Bishop of Ely, upon the occasion of that prelate's visit to the place. His administration of the See of Ely ended in 1500; for which fact the writer is indebted to the present Bishop of Ely, the Right Rev. Dr. Woodford. See *Libri Nigri Scaccarii*, II., 464.

* Chaucer's "Astrolabe" (the Ed. of the Chaucer Society), p. 3.

† "Scriptorum," &c., p. 468.

in this tale, several versions of which have been brought out by the Chaucer Society, he makes an allusion to some adventure which happened while he was a student, and before he had acquired the character of a "reverent clerke." It would appear that, like Chaucer himself, Nicholas was in favor with the famous Duke of Lancaster.

Heilbronner says that Nicholas flourished about the year 1355, and that he "ended life" a cenobite; but what portion of his life was spent at sea does not appear. It is possible that he went to the north with the Norfolk fleet, and it would seem that he was a practical navigator. However long he may have followed the sea, he at last found grateful repose within the cloisters of his convent, devoting his days to science and religion.

His voyage must have been made from the port of his native town called Lynn Regis. The town was one of great antiquity, having received its first charter from King John, this being followed by no less than eleven others, all of which, with their seals, are still carefully preserved. At a very early period Lynn was an important seaport. It contained various convents and churches. The latter, in connection with numerous crumbling antiquities, render Lynn a place of very great interest. The thoughts of the people, like the air of the town itself, were full of the ocean breeze, and even the monk in his cell felt many of those subtle influences which pervade the maritime provinces and invite men to wander abroad. In the case of Nicholas, duty may have united with natural inclination in alluring him away upon unknown seas. At all events, he became a sailor, and, as Chaucer writes: "With many a tempest hadde his berd be shake." Thus he won his place as a mariner in the annals of his time.

Two works have been attributed to Nicholas of Lynn; the "*Inventio Fortunata*," a copy of which he presented to Edward III., and an astronomical Kalendar, adapted more or less to practical navigation. The latter is still preserved, and its contents are indicated by Bale. It treats of the length of the days, the oppositions and conjunctions of planets, and gives a table of eclipses calculated for 75 years, together with a description of astronomical instruments.*

* "Kalendarium indicans rerum locum Solis, quantitatem dierum artificialium et vulgarium, oppositiones et conjunctions planetarum, &c., cum tabulis Eclipsium ad 75 annos et descriptione quorundam instrmentorum astronomicarum." A recent note

The work by which Nicholas of Lynn will longest be remembered is not now to be found. It is possible that if a copy were discovered it would add little to his fame. It may have appeared in print at the end of the fifteenth century, though no mention of its publication has been pointed out. Its disappearance under any circumstances is not a matter of surprise, since of many important works once well known no copy remains to-day, while of others there are only one or two examples.

Unfortunately, we know almost as little about the voyages made from Lynn by the fellow townsmen of Nicholas as about the book in question. Many hardy mariners sailed from the port of Lynn, but of their enterprise at the north only the most scanty memorials remain. It is nevertheless clear that their activity was appreciated by Edward III., while their neighbors of Blakeney were several times favored by that king on account of their superior merit.* But while mention has been found of no particular northern voyage from Lynn, we must not forget the fact already stated, that in 1415 the people of that place were ordered to make no voyage to Iceland except in accordance with the rules observed in ancient times. Possibly, therefore, one of the five ships reported at the north in 1415 was from Lynn.

It may also be noticed that in the ancient manuscript records of Lynn there is a reference to armour for the use of the "North Fleet."†

on page 59 of the MS. says: "Hoc Kalendarium fecit Nicholaus de Linea Ord. B. Mariæ de Monte Carmeli inter Lectores S. Theologiæ Univ Oxon. 1386, ad petitionem et complacentiam illustrissimi Principis D. Joannis Ducis Lancastriæ, incipiens a fine Kalandarii Revendi Magistri Walteri Elvenden." (Catalogi Liborum Manuscriptorum Angliæ et Hiberniæ," Oxford, 1697, No. 6904 (56), Wortley MSS., p. 213. John Bale gives the heads of the 13 chapters composing the work, among which is one on the Astrolabe. See "Scriptorum illustriu maioris Brytannie," &c., Bale, 1557, p. 468.J. Bale is not to be confounded with Robert, the Carmelite friar of Norwich, who became a Protestant in the reign of Edward VI. Heilbronner follows Bale in his "Hist. Matheseos Universæ," Leipsic, 1742, p. 490. According to Mr Skeat (Chaucer's Astrolabe, p. 73), Tanner follows Hakluyt. Tyrwhitt, in his "Canterbury Tales" (p. 626), shows little discrimination in declaring that Hakluyt's account is a mere fable. This is evident from the authorities Hakluyt gives. Leland's "De Scriptoribus," &c., may also be consulted, and Petsius' unfinished "Relationvm Historicum de Rebus Anglicis," I., 505: Paris, the Cramoisy Press, 1619.

* Hakluyt, I., 120.

† Mr. Michael Mitchell, of the Town Clerk's office, Lynn, now known as "King's

There is one curious thing to be mentioned, namely, that on certain maps of the Orcades, and notably on Black's Atlas, some rocks are laid down north of Ronaldsha as "Altars of Lina." In an old folio on the Orcades, there is the following: "The Altars of Linay reach above quarter of a mile from the shore, and are visible with low spring tide."* Thus far, however, it has been impossible to discover any tradition in connection with these rocks, though it may perhaps be admissible to suppose that, in voyaging northward, Nicholas was accustomed to stop at the Orcades, and that in some way his name became connected with these rocks, which formerly must have risen high above the sea, presenting a marked appearance suggestive of altars.†

Among the manuscripts of Sir Thomas Hare, at Stow Hall, is one which, under date of March 16th, 1337, mentions a ship at Lynn, called "The Petre," Edmund Ferrers, of Wygendale, being

Lynn," writes: "As to Nicholas of Lynn, I beg to inform you that I do not find any mention of him in the Lynn records, the earliest book of entries of which is the 'Red Register of Lynn'—which is contemporary with Nicholas. There is, however, a short entry in this register about *providing armour for the use of the 'North Fleet,'* which may probably refer to the equipment of one of Nicholas' expeditions.' (Letter of October 13th, 1879.) I am also indebted to this gentleman for a variety of views of interesting objects in the town. I am indebted to the Rev. C. R. Manning, of Diss, who is secretary of the Norfolk & Suffolk Archæological Society, and the Rev. Edward I. Alvis, of East Winch, for information contained in Richard's History of Lynn, Vol. I., p. 586, Ed. 1812. Richards says: "Like the great Roger Bacon, who lived about half a century before him, Nicholas belonged to the religious order of Grey Friars, or Franciscans, otherwise called Cordeliers and Minor Brethren." He also thinks that he died at Lynn, though unable to fix the year, and that he was buried in the dormitory of the Grey Friars; and suggests that "the Grey Friars Tower" in Lynn was used by him in making observations. It would appear, however, that Nicholas was a Carmelite.

* "General Atlas," Edinburgh, 1851, Sheet IX.

† Mr. Anderson, of the Society of Scottish Antiquaries, well known for his knowledge of all that relates to old northern antiquities, writes, under date of Feb. 6th, 1880: "It occurs to me that the name may be accounted for without either history or legend. The old Norse word *Hlein* means a rock running out into the sea like a pier—a natural pier or breakwater—and the verb *Hleina*, from which it is derived, means to save or protect. *Hence* comes the name of the goddess *Hlin* (the wife of Odin), the saviour or protectress. Hence, also, I see no difficulty in the origin of a mythological name for natural objects whose every-day name was so like that of Odin's wife. *Se non e vero e ben trovate.*" It should be added, however, that the subject of the monk of Lynn was not brought to the notice of the above learned writer, a request having been made simply for some explanation of the legend on the map.

master.* It would be useless to indulge in any speculations concerning the connections that may have existed between Nicholas and John de Haddon, Admiral of the Fleet for the " parts Boreal." The British navy was founded by Alfred the Great, and in the fourteenth century it was, in a sense, a recognized institution. In 1354 de Haddon appears to have used both Hartlepool and Newcastle-upon-Tyne as naval stations ;† the latter being not far from Lynn, while the former, situated on the coast of Durham, afforded a most convenient base for operations towards Iceland, whither, as we have seen, one of the king's ships went with a trading fleet in 1415.

In the fourteenth century Ranulfus Higden wrote his well known " Polychronicon," but, though a contemporary of Lynn, he makes no reference to his voyage. Higden died about the year 1363, while the voyage of Nicholas is set down for 1360. The early part of the

Ranulfus Higden's Map, A.D. 1360.

work, where the reference to Nicholas would belong, was probably composed some time before his death, and possibly prior to 1360. Higden, therefore, may have known of Lynn and his voyage, though he fails to mention him. Higden gives a description of Iceland, based more or less on Giraldus Cambrensis, and adds a map of the world, upon the northern part of which Iceland appears as " Tile."

* " Third Report of the Royal Commission," (1872), p. 251.

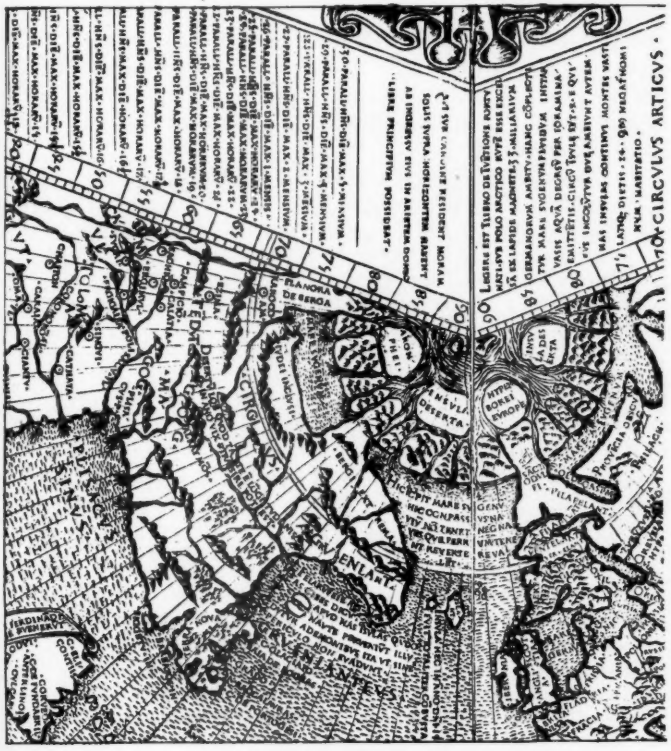
† *Fœdera*, v., 778.

The earliest allusions to the *Inventio Fortunata* of Lynn is found upon the margin of a map by John Ruysch, which appeared at Rome in the Ptolemy of 1508. On this map is a legend somewhat to the following effect: "It is written in the Book of the Fortunate Discovery that, under the Arctic Pole, there is a high magnetic rock 33 German miles in circumference. This is surrounded by the fluid sugenum sea, that as a vase pours out water by four mouths from below. Around are islands, of which two are inhabited. Mountains vast and wide surround these islands, 24 of which deny habitation to man."*

This would seem to indicate that the book written by Nicholas of Lynn was known to the mapmaker, while, also, it may have been known at Rome. It is evident that the polar region was drawn more or less in accordance with some plan by Nicholas, which was combined with later material. Around the magnetic rock, immediately under the pole, are four islands, "Aronphei," "Insvla deserta," "Hyperborei Evropa" and "Insvle Deserta." Outside of these islands are smaller and mountainous islands, arranged in a semi-circle, while the peninsula of "Pilapelanti," with its base resting upon Europe, pushes out into this druidic arrangement of islands, bearing up what is intended to represent a church, with the legend "Sacte Odulfi." Eastward of this peninsula is the "Provîcia obscura," and the "Mare Svgenvm." Westward of "Bergi extrema" another peninsula enters the group of islands, which is pierced by "planora de Berga" at the extreme west. The "Mare Svgenvm" also fills the west. South of "Grvenlant" is "Terra Nova," or New Foundland. From the "Mare Svgenvm" the water flows northward through the four openings into the polar basin. The arrangement is curious, yet not wholly without resemblance to what is found in nature; for what is called the polar basin is fed by several vast streams pouring into it from the warm regions at the south. These streams also create counter currents, which flow southward, bearing

* "Legere est ī Libro de Iv̄tione fortvnati, svb polo arctico evp̄ esse excelsû ex lapide magnete 33 miliarvm germanorvm ambitv. hanc cōplectitvr mare svgenvm flvidvm instar vasis aqva deorsv per foramina emetettis. circv Isvle svt & eqvibvs incolvtvr dve ambivnt avtem has insvlas continvi montes vasti latiq dictis. 24 qb negat hominvm habitatio." This is obscure and appears to have suffered in the hands of the engraver. Our translation may not prove very satisfactory.

enormous quantities of the heaviest ice. Nicholas of Lynn doubtless understood something of this fact, but it would appear from the use he made of Giraldus Cambrensis, who wrote in 1187, that, unfortunately, he gave the author of *Topographia Hibernica* the credit



A Section of the Map of Ruysch, 1508.

of being better informed than himself. The monk of Lynn was clearly indebted to Giraldus for the description of the streams. In turn Giraldus refers to "the philosophers" who describe them.*

* "Non procul ab insules ex parte borealis, est maris quædam mirando vorago. Ad quam remotes partibus omnes indiques marini fluctus tanquem ex condicto confluunt

This basin or whirlpool at the north, with the four entering streams, appears to be a venerable institution. Yet it may after all be founded upon what is observed to-day, in connection with the Gulf Stream and the Kuro Ciro, and may be connected with the observations of such navigators as Pytheas, who went to the north. The magnetic rock under the pole, on the map of Ruysch, or rather, we may perhaps say, of Nicholas, deserves attention, as it has been claimed that the monk had applied his mind to one of the most difficult of problems and that the magnetic mountain stands for the solution thereof.

The attention of Humboldt does not appear to have been drawn to Nicholas, but, in treating the history of the magnet, the great investigator calls attention to the fact that "on the remarkable chart of America appended to the edition of the Geography of Ptolemy published at Rome in 1508, we find the magnetic pole marked as an insular mountain north of Grventlant." In 1545, Martin Cortez placed the magnetic pole further south, as did Sanuto in 1588.* That Nicholas entertained fanciful notions is not at all strange. Sanuto held that if men were ever so fortunate as to reach the magnetic pole, they would experience some miraculous effect. Columbus, likewise, was full of curious fancies, holding for instance, that, west of the Azores, ships sailed up hill towards the unapproachable Paradise.† It would have been a happy thing if the false notions of Nicholas of Lynn had not misled others. First, however, it must be indicated that the magnetic mountain of Lynn was borrowed from the early philosophers and geographers. Galen reports magnetic rocks on the coasts of the Indian ocean, and St. Ambrose echoes the idea; while the Arabic geographer Edrisi, of the twelfth century, author of a Map of the World, of the year 1154, reported a magnetic mountain at the mouth of the Red sea, it being 12 miles long and surrounded by islands, acting upon

et concurrent: qui in secreta naturæ penetralia se ibi transfudentes, quasi in abyssum vorantur. Si vero navem hoc forte transire contigerit tanta rapitur et attrahitur fluctuum violentia ut eam statim irrevocabiliter vis varæitatis absorbeat. Quatuor hujus modi oceani voragines, quatuor appositio mundi partibus, philosophi describunt. Unde et tam marinos fluxos, quam etiam ælicos flatus causaliter provenire nonnulli conjectant."—Top. Hibernica, c.xiv.

* Cosmos, II., 659; *Examen Critique*, III., 60.

† "Select Letters of Columbus," p. 133.

the iron in ships and holding them fast.* In Ruysch's Ptolemy of 1508 is found a similar account, the island being in the possession of anthropophagi, or Manioles. It is surrounded by ten other islands. The magnetic attraction was so powerful there, that it was necessary in building ships to use wooden nails.† In these accounts, as in the map of Ruysch, the magnetic island stands in a circle of islands.

Edrisi's Map. A. D. 1154.

* "Life of Columbus," by Goodrich, p. 48. Ed. New York, 1874.

† "Feruntur et hic aliæ insu'æ cotinue esse numero dece Maniolæ appellatæ qbus dicut navigia que clavos ferreos hnt detinieri ne qn lapis herculeus qui circa ipsa

The map of Ruysch alone is the authority for connecting Lynn's name with the magnetic mountain. The accounts preserved by Mercator and Dr. Dee do not mention the magnetic rock, the ships being driven by the currents or indraughts. Nicholas understood something of polar magnetism, and supposed that it was to be explained by the aid of a magnetic island like that of Ptolemy, and accordingly created one. It was partially suggested as hypothetical. Of the extent of his actual knowledge in connection with polar magnetism it is impossible to speak.

It will be necessary, however, to notice the blunder into which the map of Ruysch led Humboldt, who, contrary to his usual custom, hastily accepted a suggestion found in Biddle's Life of Cabot. Mr. Biddle, in seeking to exalt his hero, dwells upon what Cabot observed in connection with the variation of the compass, and says that his earliest transatlantic voyage carried him "to the very quarter where it is exhibited in a manner so sudden and striking that modern navigators seem to concur in placing there one of the magnetic poles." As respects the locality of the voyage in question, however, there is much doubt, the so-called map of Cabot being no authority on the subject.* Mr. Biddle nevertheless continues: "There is a curious piece of evidence to show how early the northern region discovered by Cabot was associated with the alarm which this phenomenon [the variation] must, in the first instance, have excited," adding: "On the great map of the world which accompanies the edition of Ptolemy published at Rome in 1508, is the following inscription," which he gives in Latin, but which is Englished as follows: "Here the ship's compass loses its property, and no vessel with iron on board is able to get away."† On this, the author

gignit illa traheret obg hoc sup trubib ea i sicco firmari assernt." (Ruysch's Ptolemy of 1058, Lib. VII., c. ii.) On map xi., f. 165, the islands are laid down, with a legend containing the idea already expressed. See also Bergeron's "Voyages faits principalement en Asie," Tome I., p. 25; and the Ptolemy of Ruscelli, Venice, 1574, p. 328.

* See the author's article in the "Compte Rendu" of the Americanistes, Brussels, 1880.

† "A Memoir of Sebastian Cabot," p. 179, Ed. 1832. The Latin is as follows: "*Hic compassus* naviv. no tenet nec naves que ferrum tenent revertere valet." No such absurd statement could have come from either of the Cabots.

says that "it is impossible to doubt that the reference is to the well-known effect produced there on the compass. Beneventus, who prepared the supplemental matter for this edition of Ptolemy, professes to have a knowledge of the discoveries made by Columbus, by the Portuguese, and by the English." He also refers to Fournier, who says that Cabot marked exactly in various places the dipping of the needle.* Humboldt, in noticing this, says that Biddle "observes with justice, that a remark inscribed on the Mappemonde of Ptolemy" "appears founded on the ideas of Cabot relative to the position and proximity of the magnetic pole."† Nevertheless, a more careful examination of the general subject, in connection with Nicholas of Lynn, would have shown Humboldt that there was no reference whatever in the legend to the discoveries of Cabot, but that the reference was to the teaching contained in the monk's *Inventio Fortunati*, itself an echo of Ptolemy and the ancients. Biddle says that the inscription appears "far beyond terra nova," while Humboldt loosely says, "before or near (*pres*) New Foundland." Both are quite wrong, as the legend stands north of Greenland and Iceland, at the entrance of the polar sea, evidently being placed there for the reason that there was not sufficient room nearer the magnetic mountain. Humboldt, by the aid of Mr. Biddle, simply fell into a blunder, confusing a monastic hypothesis with the supposed record of an actual observation by Cabot. This error does not appear to have been noticed hitherto.

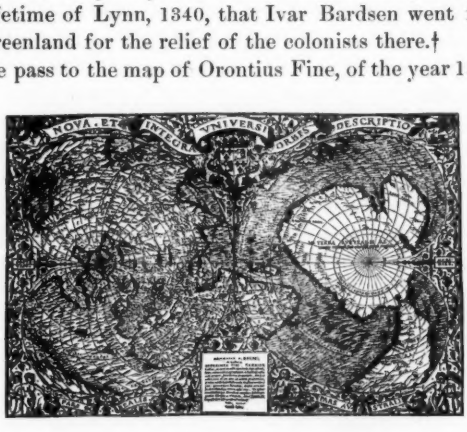
The arrangement of the land and water around the pole on Ruysch's map is conventional, and it may be questioned whether the great peninsula called "Grvenlant" was a part of Lynn's plan. At all events, he had ample opportunities of becoming acquainted with Greenland when making his voyage to the north, as in 1379 the Ice-

* "Memoir," &c., p. 179.

† "M. Biddle, auteur du savant *Memoir of Sebastian Cabot*, qui a paru en 1831, observe avec justesse (chap. 26, p. 177-180) qu'une remarque inscrite dans la Mappemonde de Ptolémée ajoutée a l'édition romaine de 1508, remarque d'apres laquelle 'pres de Terre Neuve et l'ile de Bacalaurus, la boussole ne gouverne pas, *nec naves quæ ferrum tenent revertere volent*,' parait fondée sur les idées de Cabot relatives à la position et à la proximité du pole magnetique boreal."—("Examen Critique," III., 32.)

landers were still well informed respecting that country.* Indeed, there is good reason for supposing that the map of Ruysch shows less knowledge of Greenland than Nicholas possessed, as the monk was a contemporary of the Zeni and Bardsen; for it was during the lifetime of Lynn, 1340, that Ivar Bardsen went from Norway to Greenland for the relief of the colonists there.†

Next we pass to the map of Orontius Fine, of the year 1531, which



shows the influence of Nicholas, as exerted by Ruysch; for there is no evidence at hand proving that Fine had seen the book called *Inventio Fortunata.* Fine's map represents the circumpolar region complete, and retains the four inner islands shown by Ruysch. The outer circle of islands is broken, while "Grvenlant" appears as an island widely separated from Asia. Iceland and the Orcades appear in their proper relative positions; "Baccalar," which included New Foundland and Labrador, being a part of Asia, in accordance with the Columbian idea.

The next trace of Nicholas, the monk of Lynn, is found in the work of Las Casas, written in 1552–61, where he speaks of floating islands, and refers to those of Northern Italy, mentioned by Pliny, and where he also mentions the floating pummice-stone described by

* "Islenzkir Annálar," p. 330.

† See "The Sailing Directions of Henry Hudson," and Bardsen's Commission in "Arctike landes Gamle Geographie," p. 47.

Seneca. Passing from these cases, he mentions "certain islands which swim on the water," saying "of this kind must have been those which are called Saint Brandon, in whose history, it is said, you may read of many islands that were seen in the sea surrounding the islands of Cape Verde and the Azores, which are always in a state of conflagration, and which must be similar to those spoken of above," adding, "of the same mention is made in the book of *Inventio Fortunata.*"*

Nicholas of Lynn also appears upon the map of Mercator, 1569, whereon the polar regions are delineated more or less in accordance with the conceptions of the famous monastic voyager, while the map shows that Mercator obtained his information through Cnoyen.†

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* A esto decia Cristóbal Colon, que podian ser aquellas islas de las, que tracta Plinio, Lib. 2, c. 97, de su 'Natural Historia,' que hácia la parte del Septemtrion, socaba la mar algunas arboledas de la tierra, que tienen tan grandes raíces, que las lleva como balsas sobre el agua que desde lejos parecen islas. Ayuda á esto lo que dice Seneca en el lib. III. de 'Los Naturales,' que hay natura de piedras tan esponjosas y livianas, que hacen dellas en la India unas como islas que van nadando por el agua, y desta manera debian de ser las que dicen Sant Brandan, en cuya historia diz que se lee que fueron vistas muchas islas por la mar de las islas de Cabo Verde ó de las Azores, que siempre ardian y debian de ser como las que arriba se han dicho: de lo mismo se hace mencion en el libro llamado *Inventio fortunata.*" Historias de las Indias, in "Documentos ineditos," Tom. LXII, p. 99. For the passage of Seneca, see "Œuvres Complètes," Tom. VIII., p. 230; for Pliny, Bohn's ed., p. 122.

† Mercator says: "Touching the description of the north partes, I have taken the same out of the voyage of Iames Cnoyen, of Hartzeuan Buske, which alleageth, * * among the rest, he learned of a certaine priest, in the King of Norwayes court, in the yeere 1364. This priest was descended from them which King Arthur had sent to inhabit those Islands, and he reported that in the yeere 1360 a certain English Frier, a Franciscan, and a Mathematician of Oxford, came into those Islands, who leaving them, and passing further by his Magicall Arte, described all those places that he sawe, and tooke the height of them with his Astrolabe, according to the forme that I, Gerard Mercator, have set down in my mappe, and as I have taken it out of the aforesaid Cnoyen. Hee sayd that those foure Indraughts were drawne into an inward gulfe or whirlepoole, with so great a force, that the ships which once entered therein, could by no meanes be driven back againe, and that there is never in those parts so much winde blowing, as might be sufficient to drive a corn mill.'" (The "Principal Navigations," by Hakluyt, I., 122.)

This Oxford friar referred to by Cnoyen, was none other than Nicholas of

Another reference to the subject is found in the Life of the Admiral, heretofore generally attributed to Ferdinand Columbus. The text runs as follows: "Juventius Fortunatus relates that there is an account of two islands towards the west, and a little southward than the island of Cape Verde, which skim along upon the water."* Now, if we are correct, the writer here alludes to the *Inventio Fortunata* of Nicholas of Lynn, though the editor of the Life of the Admiral, whoever he may have been, makes the title of the book itself the name of the author. It is indeed possible that such a person as "Juventus Fortunatus" wrote on geographical subjects and hence was quoted, but the probabilities are against this view. At all events, no such work now exists in the Colombina Library at Seville, where we should expect to find it, for the reason that the library in question is none other than the library of Ferdinand Columbus, the reputed author of the Life of the Admiral. Nor does this library contain the *Inventio Fortunata* of Nicholas; which constitutes another argument, such as it is, to prove that Ferdinand did not write the book attributed to him, or at least that he did not compose the work in its present form. The catalogue of the Colombina has been searched diligently for some indication of such work, but in vain.† An inquiry has also been made respecting the

Lynn, concerning whose work something more will be known when the fortunate antiquary draws out from its hiding-place the book of Cnoyen, which Mercator says contained his voyage "throughout all Asia, Africa and the North," a book which "was lent me in time past, by a friend of mine at Antwerpe." He adds: "After I had used it, I restored it againe; after many years I required it again of my friend, but he had forgotten of whom he had borrowed it." (Principal Navigations, "I., 445.)

* "Et Inventio Fortunato narra, sarsi mentione di due altre Isole, volte all' occidente, & piu Australi, che le Isole de Capo verde; le quali vanno sopra l'acqua nutando." (Historie del S. D. Fernando Colombo," &c., 1571, c. viii.)

† The writer is under very great obligations to Mr. Charles H. Eder, United States Consular Agent at Seville, who, in February, 1879, carefully searched the catalogue of the Colombina. Though some of the books that once belonged to this valuable collection, which formed the library of Ferdinand Columbus, are missing, the Inventio Fortunata does not appear in the catalogue. Among the entries are the following: "Inventus, Presbiter, Atlas de mano," now lost; "Fortunato fiol de Passamonte en Toscano"; "Fortunato perisumus gliliû montes pietatis," &c.; "Fortunatus, Presbiter, Vita Sa Martini."

book of Knoyen, through which the author of the Life of the Admiral might have learned the story of Nicholas. This work is also wanting in the Colombina catalogue. It is nevertheless clear that Columbus made a careful examination of the arctic question. In the course of his studies he might have seen the Inventio Fortunata. That he had examined the subject is evident from his Memoir or Annotations upon the Five Zones, in which he sets forth the theory found in the "Imago Mundi," holding that the north was inhabitable, and proving it out of his own experience in 1477.*

In 1589, Blundeville expressed an opinion derogatory to Lynn, holding that the voyage attributed to him could never have been performed without the aid of some "colde devil."†

We now pass to the celebrated Dr. John Dee, a large number of whose invaluable manuscripts were destroyed by a mob at Mortlake in 1583, who evidently knew the manuscript of Nicholas; and Hakluyt, in 1599, gives an additional testimony from the Astrologer. It runs as follows: "Ano 1360, (that is to wit, in the 34 yeere of the reigne of the triumphant King Edward the third), a frier of Oxford, being a good astronomer, went in companie with others to the most Northern Islands of the world, and there leaving his com-

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* The "Imago Mundi" was studied and annotated by Columbus. The sixth "Inference" of Chapter VII. speaks of those who live under the pole, and of their condition. The writer has found no trace of the "Memoria" on the "Cinque Zone," mentioned by Humboldt (Cosmos, II., 611), who appears to speak loosely in saying that "it has now become extremely rare." See also "Examen Critique," II., 105; and V., 213.

† The following is Blundeville's account: "Moreouer, the north side of the promontorye Tabin hath 76 degrees of latitude, which place, whatsoeuer Plinie saith thereof in his fourth booke of Histories, yet I beleeve that no Roman came ever there to describe ye Promontory. Neither doe I beleeve that the Fryer of Oxford, by virtue of his Art Magicke, euer came so nigh the Pole to measure with his Astrolabe those cold parts together with the foure floods, which Mercator & Bernardus do describe both in the front, and also in the nether end of their maps, & unlesse hee had some colde devil out of the middle Region of the aire to be his guide, and therefore I take them in mine opinio to be meer fables." (A Briefe Description of Vniversal Mappes and Cardes, and of their vse: and also the vse of Ptholemey his Tables, by Thomas Blundeville, London, 1589, 4to, p. c. 2.) The work of Bernardus Puteanus, of Bruges, 1579, does not appear to be known. See Voyages of John Davis, p. lxxxviii., 1880.

pany together, hee travailed alone, and purposely described all the Northern Islands, with the indrawing seas: and the record thereof; at his returne he delivered to the King of England. The name of which book is Inuentio Fortunata (aliter fortunæ) qui liber incipit a gradu 54 vfque ad polum. Which frier for sundry purposes after that did five several times passe from England thither, and home again."*

As late as 1659, the story of Nicholas of Lynn was echoed by geographers and cosmographers. Heylin wrote about the great rock at the pole, and the four indraughts or Euripi, which swallowed up ships, and added the story of the pigmies, mentioned on Mercator's map of 1542.†

Among the maps which give more or less exactly the ideas represented by Ruysch, that made in 1572 for Munster, copies of which are found in Belleforest of 1575. Linschoten's map of 1595 faintly shows the Euripi. The Ortelius of 1599 also shows them faintly.

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* Hakluyt, I., 122.

† "Under the Arctick Pole is said to be a *Black Rock* of wondrous height, about 33 leagues in compass; the Land adjoyning being torn by the sea into four great ilands. For the Ocean violently breaking thorow it, and disgorging itself by 19 Channels, maketh four Euripi, or fierce *Whirlpools*, by which the waters are finally carried towards the North, and these swallowed into the Bowels of the Earth. That *Eurpius* or *Whirlpool* which is made by the *Scythic* Ocean, hath five *Inlets*, and by reason of his strait passage, and violent course, is never frozen: the other on the back of *Greenland*, being 37 leagues long, hath three inlets, and remaineth frozen three months yearly. Between these two lieth an Island, on the North of *Lappia* and *Biarmia*, inhabited as they say by *Pygmies*, the tallest of them not above four foot high. A certain *Scholer* of *Oxford* reporteth, that these four Euripi are carried with such furious violence towards some *Gulf*, in which they are finally swallowed up, that no ship is able with never so strong a Gale to *stem* the *Current*, and yet there is never so strong a wind as to blow a windmill." ("Cosmographie," B. IV., p. 191, Ed. 1659.)

On the next page, Heylin adds: "But Blundeville our Country man is of another opinion (as indeed who is not?) neither believing that *Plinie* or any other of the *Roman* Writers came hither to describe this *Promontory:* or that the *Oxford Frier*, without the assistance of some cold *Devil* of the *middle region* of the Aire (and consequently able to endure all weathers) could approach so near as to measure these cold countries with his Astrolabe, or to take the height of this *Black Rock* with his *Jacob Staff*."

The Mercator of Hondius, 1607, wants them; but the "Fasciculus Geographicus," of Matthew Quod, 1608, shows the Euripi fully, as does the Hondius of 1619, in which there is an allusion to the "fabulous Knoyen," (*Ce fabuleux Cnoxe.*) In 1625, Purchas copied the map of Hondius, who repeats the then current account of Lynn (III., 624). Further on (p. 853) he says that Mercator "was abused by a map sent unto him, of foure Euripi meeting about the North Pole."

In all these accounts there is, however, nothing to impugn the general statement respecting the voyage of Nicholas into the far North. If correctly reported, he may have fancied that he knew all about the Pole and that he had solved the problem of the magnet, by putting one of the old magnetic mountains in the north. If he was deceived, it may be said that he was not the first navigator who indulged imagination at the expense of truth. He is made to say that great tides drew ships into a fatal gulf, but if this is used to prove that he never saw the north, then the stories of the Norwegian sailors respecting the Maelstrom, found until recently on many maps, would indicate that after all they also never saw the sea. In the early times, what havoc could not the cosmographer have made of the statement of Davis, who saw the northern sea "falling down into the gulf with a mighty over-fall"? What is needed is the narrative of Nicholas, which he presented to Edward III. This may yet be drawn forth from some musty and forgotten collection.

In closing we may pause to inquire how far north the ancient navigators penetrated. The Icelandic colonists in Greenland may have reached a very high latitude during the three hundred years that they visited there, but the highest point indicated is that near Cape York, in 72° N. Upon an unpublished Spanish globe in the National Library at Paris, of the date of about 1540, is an indication which possibly may prove that some navigator had pushed through Smith's sound and Robeson channel. Many unrecorded expeditions were doubtless made into the north, and this globe may contain the memorial of some French, Spanish or Portuguese voyage not far from the year 1500. In 1500 and in 1501, expeditions went north under Contereal, who also went in 1502, never to return. On the east coast of Greenland, so far as our knowledge goes, exploration was not carried high up, though

Columbus, in going three hundred miles beyond Iceland, must have sailed close to the northern border of Greenland. If he had persevered, he would have struck the New World in 1477. The early navigators appear to have pushed northward to the pack ice, but there is no indication of their having known either Jan Mayen, or Franz Joseph's Land, though they may have seen both. The map of the Zeno Brothers, the result of the voyage of 1380, stood unequalled down to 1558, no improvement in the cartology of Greenland being made until the voyage of John Davis, in 1585. The results of his observations in Greenland were indicated by Molyneux on his globe of 1592 and on his map of 1600, which was engraved by Wright, being projected on the plan attributed to Mercator. The map of 1600 appears to be the one referred to by Shakespeare in *Twelfth Night*, as "the new map with the augmentation of the Indies."

In 1511, the Lenox Globe showed an open sea around the pole, and in 1529 the Verrazano Map left the sea still open, though in the antaratic region a great continent was beginning to appear south of Cape Horn. Herein was the partial representation of a classic myth. On Mercator's map of 1569, the antarctic continent exults in astounding proportions. Notwithstanding the great benefits conferred upon geographical science by Mercator, the knowledge of the globe in some respects was retarded in his hands, owing to the weight of his reputation. The northern region also was in time filled up, and ever since geographers have been struggling to recover the original conception of a polar sea. Shall we succeed? Of speculation on this point we have had enough, and the question remains to be decided by events. One thing, however, has become clear, namely, that the prospect of sailing to the pole by the way of Smith's Sound is far from encouraging. Manifestly, beyond a certain point, the route must be pursued by sledging. On the other hand, the route by Behring Straits is still to be fully tested. The *Jeanette* under Captain de Long, which last year passed within the ice belt, sailing for Wrangell's Land, is yet to be heard from. The establishment of the proposed colony at Discovery Bay, in latitude 81° 44′ N., also awaits its accomplishment. When this is done, as probably it will be done in the summer of 1881, explorers will be prepared to make fresh advances north of Smith's Sound, and thus enter seri-

ously upon the work of reaching the pole. Captain Nares predicts that this can never be done, as, in his judgment, the ice is too rough for rapid sledging, while a powerful current is continually carrying the ice southward. The opinion of so brave and skilful an officer is not to be treated lightly; yet there is no proof that the current always acts as it did when Captain Markham made his great sledge journey to 83° 20′ N., the highest point yet reached, nor that the ice is always in the same rough condition that made his progress so slow. These are points that remain to be decided by a permanent colony. In that sledge journey, Captain Markham's party was prostrated by scurvy, the scourge of the north, though a disease which a proper supply of provisions will obviate. Evidently, too, the season passed in the north by the Nares expedition was one of unusual severity. As it remained, Captain Markham reached a point where the water had shoaled to 70 fathoms, indicating approaching land. They turned back when only 399½ miles from the pole. It is not unreasonable to suppose that land actually exists a short distance north of this point. If so, that land may be gained and used as a base of operations for the regions beyond. The question of reaching the pole is now being resolved into one of equipment, while in this department something is yet to be learned. The first thing to be achieved is the establishment of the permanent colony at Discovery Bay, after which must follow the use of every appliance that science and ingenuity can devise. In this respect the Nares expedition was not altogether perfect. Indeed, no temporary expedition can meet all the conditions. Permanence in operation must characterise any successful plan to reach the pole. The explorer must be made independent of ships; he must have adequate means of resisting the cold, and antiscorbutics that will insure health. These things are certainly possible, and when secured the arctic adventurer can bide his time and await the favorable season; in the meanwhile spending his time in those general observations that will prove of such incalculable scientific advantage. Haste will form no part in that great campaign which must conduct the explorer to the pole. The work will require time, and the highest courage and perseverance. The explorer will have no assistance from the natives beyond what he gains from those who live south of Discovery Bay. That he will find, as he pushes into the far

north, any "Arctic Highlander," living in seclusion with herds of musk ox and reindeer, is a mere chimera.* Ellsmere Land, far south of Discovery Bay, appears to be the northern limit of the Eskimo. Wherever man goes in that high northern region, he must carry the bulk of his supplies with him, as it will be found impossible to subsist by those means employed by Lieutenant Schwatka in the southward regions while engaged in the Franklin search. Everything depends upon those calculations which will enable the explorer to gauge his strength with exactness and maintain his connection with the base of those supplies which annual relief expeditions, independently organized and maintained, will furnish in unfailing abundance.

With a proper equipment, the dangers of arctic explorations are reduced to the average of the ordinary seafaring life, and experience proves that such work in the north can no longer be objected to on the ground of its risk. Indeed, arctic exploration may now be considered as an accepted branch of study, and as a wise extension of the Signal Service into the realm of perpetual cold. This being granted, the ultimate results will take care of themselves; for, with prudence, courage and perseverance, the dream of the middle ages will be realized, and the American flag will be planted at the Pole.

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* The portion of our paper which covered this point, and showing that the Eskimo were a litoral people driven northward from the Middle Atlantic coast, has been expanded and published in the *Popular Science Monthly*, November, 1880, under the title of "The Glacial Man in America."

THE CHANGES IN THE PHYSICAL GEOGRAPHY OF THE ANCIENT HOME OF MAN IN CENTRAL AND WESTERN ASIA.

BY
THE REV. OWEN STREET.

We are safe for the present in assuming that the race of man must have originally spread over the earth from a common centre. We are equally safe in insisting that the indications of ethnography, of language, of existing monuments, of the early migrations and of history, point in a general way to Central and Western Asia. Locate this original centre anywhere between the sources of the Euphrates on the west and the sources of the Oxus on the east, and it falls within the sweep of the physical changes that are to occupy our attention.

We may look to the high table-land of Pamir, called by the Asiatics "the roof of the world," where so many have found the Mount of Paradise,* and the Ararat that received the ark, the Aryaratha of the ancient Arians; or we may take our departure from this Asiatic Olympus in the line of the first recorded migration† "*from the east* into the land of Shinar," and there we shall be in the vicinity where others have found the rivers that watered the garden of God; or we may look northward to the sunny plains of Iran, and find the home of Adam in the bright and fertile region where tradition has fixed the home of Zoroaster; or we may find the favoured spot further east in Hyrcania, or further west in Armenia: and in either case the facts and reasonings now to be submitted will have their application. We may speak of this whole region, from the most eastern limit of the ancient Persian empire to the Mediterranean, as in a general sense the early home of man, and as the theatre of his early achievements.

There were the fields of enterprise and the fountains of history; there was the home of a dominant energy that could rule the world.

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* See a learned and analytical discussion of the claims of this locality by O. D. Miller, *Oriental and Biblical Journal*, Vol. I., No. 3; article, "The Gan-Eden of Genesis," p. 134 *et seq.* Also reference to authorities and more extended treatises; *id.* notes, pp. 135 and 137. Published Chicago, 1880.

† Gen., xi., 2.

Now all is different. There is a blight upon those lands; the old impulse is dead. There is not energy enough to welcome a summons to something better, or a resurrection-power from abroad.

It is common, I am aware, to refer all this to the social, moral and political forces that have been so long operating there.

It would be easy to show that these forces have been from a very early day intensely bad and corrupting in their influence over all that field—demoralizing to the last degree; and yet they did not, for a long period of time, avail to quell the aspirations of the people for intelligence, or to keep down enterprise.

There were bred and trained conquering armies that could march to the confines of Ethiopia and shatter the walls and monuments of the hundred-gated Thebes; that could subdue the cities of Asia Minor and penetrate beyond the Bosphorus and beyond the Danube far into the region from which Napoleon, so many centuries afterward, was compelled to withdraw the wreck of his legions; and that could carry the eastern limit of the Persian dominion beyond that which Alexander was able to attain.

It is pertinent also to call to mind what we have been taught in regard to the early longevity. We find hints of this outside of the Pentateuch. In the laws of Menu, where mention is made of the four ages of the world, it is said that in these four successive ages the duration of human life went on decreasing in the proportion of four, three, two, one; and Lenormant* has pointed out four clearly defined eras of reduction in the Pentateuch which follow this proportion very nearly. First, the average of 900 years attained by the earliest generations; then the 600 years ascribed to Shem; then the 430 to 460 years, giving a mean of 445 years, ascribed to his first three descendants; then the 200 to 240 years assigned to the four succeeding generations, giving a mean of 220 years; after which the maximum falls away rapidly till it sinks to that which is still attained.

It will be seen that these numbers are quite near enough to the proportion of four, three, two, one. The Persians are said to have had a similar division of the ages; and you will, of course, recal the ages of gold, silver, brass and iron so familiar in classic literature.

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* *Contemporary Review*, Vol. II., No. 3, note, p. 51; article, "The First Sin, as Recorded in the Bible and in ancient Oriental Tradition," by François Lenormant.

This item, the early longevity, I do not propose to push to the front. I introduce it and leave it, with only the obvious suggestion that for those with whom it is an accepted truth it will be all the easier to accept the conclusion to which the different lines of investigation we now undertake will converge, viz., that in the early ages of history the inhabitants of Central and Western Asia enjoyed a more salubrious climate than is found there at the present time.

I shall take no extreme positions. A very few degrees of difference in the annual average of the temperature in any country will change the whole face of nature there and revolutionize the habits of the people. A recent French writer has estimated that so small a change as the deflecting of the Gulf Stream to the extent of four degrees of longitude away from the European coast would bring back the ice-period over France.

Let me recall to your knowledge, as briefly as I may, the present climate of the region we are contemplating.

I have collated from a large number of authors, all belonging to the present century,* a series of statements, of which, to save time, I submit the following summary. They tell us of a temperature during the summer months of 115° to 117° in the shade, and from 130° to 170° in the sun. Men and animals flee from the direct rays

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* The following quotations will show something of the uniform tenor of these representations:

June 12, place about 80 miles north of Shiraz.—"No object appeared to molest us, except the almost insupportable sun; and under it we continued to march three hours and a half across the mountains, without a breath of air moving to cool our scorched skins or a drop of water to slake a thirst that was become intolerable. The poor dogs, overcome with drouth, actually lay down again and again, and howled in such apparent agony that I began to fear they would go mad."—*Sir Robert Ker Porter*, "Travels," Vol. I., p. 483.

"The heat had now become so intense that my health began to suffer. * * * In the trenches, where I daily passed many hours, the thermometer generally ranged from 112° to 115° in the shade, and on one or two occasions even reached 117°. The hot winds swept over the desert; they were as blasts from a furnace during the day, and even at night they drove away sleep. I resolved, therefore, to take refuge for a week in the serdaubs of Mosul."—*Layard*, "Nineveh and its Remains," Vol. I., p. 130.

"The climate during June, July and August is that of a fiery furnace. The heat of the sun, increased by radiation, becomes so intense as to make existence simply misery. An ordinary thermometer bursts in such a temperature, and those that are graded high enough give the astonishing maximum of 189°, only

of the sun to any shelter they can find. The buffaloes bury themselves to the nostrils in the waters of the Tigris. This temperature prevails from Mosul to the Persian Gulf, and through most of Persia, except in the northern and mountainous districts.

At Muscat, in the sun, the thermometer attains a maximum of 189°, lacking only 23° of the temperature of boiling water. But the thermometer does not tell the worst of it. There sweeps down from the north a dry wind called by the Arabs shirmal, which is like the blast of a furnace. A change of linen, instead of imparting an agreeable sensation, seems like a fresh contact with a hot substance, the linen being many degrees warmer than the human body in its healthy state. Such extreme dry heat "deals most unmercifully with furniture. Solid mahogany desks are split, articles fastened with glue fall to pieces, miniatures painted on ivory curl like a shaving and the ivory handles of knives and forks crack from end to end."* From May till September the nights are spent on the roofs of the houses by all classes of the people. In the daytime they resort to the serdaubs, or undergound apartments, cut in Persia from the solid rock, and furnished with flues that rise like chimneys. In Mosul the serdaubs are commonly constructed under the court, and walled with stone. "Without these serdaubs,"† says Loftus, writing of Shuster, in Persia, "it would be almost impossible to exist in the hot, drying wind, which more resembles a blast from a furnace than the air of the habitable earth." A much

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23° below the temperature of boiling water. * * * But the thermometer is no fair index of the heat, for during the summer, when there is a predominance of the wind from the north, called by the Arabs shirmal, it is impossible to register by the thermometer the oppressive, stifling sensation which the system undergoes. This shirmal sweeps across the heated sands of Arabia like the blasts of a furnace, rendering the heat at midnight as overpowering as that of noonday." When he arrives in Persia we find him writing as follows: "The heat cannot be estimated with any sort of appreciation, owing to several aggravating causes. The thermometer would register 115° in the most favorable circumstances in our room, while outside there is a radiation of 175°. But this fails to give any idea of our steamy, confined quarters, our discomforts and our exhausted natures, with no prospect of relief."—"*Midnight Marches Through Persia*," by Henry Ballantine, A.M., 1879, pp. 24, 75–76. (See also pp. 69, 70, 83, 151, 172.)

* *Laurie*, "Life of Dr. Grant," p. 202.

† *Loftus*, "Travels in Chaldæa and Susiana," p. 304.

larger proportion of children die in Persia than in America, both in European and native families, and the average of longevity is from 10 to 15 years less than here.* The winters over large portions of this area are alike extreme in their severity.†

We consider next the question, what reasons can be given for the opinion that this region was once favored with a better climate?

We may cite, first, the general impression that such writers as Herodotus and Xenophon make upon us by their silence; by the absence of positive statements like those of the modern writers to which I have referred. They both had opportunity to observe and know for themselves. It is especially strange that Xenophon, who chronicles every inconvenience in the matter of supplies and the crossing of rivers, and the faint-heartedness or treachery of individual men, should have nowhere alluded to the oppressive heat. We should certainly look for some such allusion in his account of the thirteen days' march of the army of Cyrus, in the month of August, from Corsote to Pylae. "In this march," he says, "many of the beasts of burden perished of hunger; for there was neither grass nor any sort of tree; but the whole country was completely bare." Yet not a word of any discomfort from the heat.

A single incident stands out with special significance in the midst of this silence. "About the time of full market," he says, "Pategyas, a Persian, one of Cyrus' confidential adherents, made his ap-

* "Narrative of Eight Years' Residence in Persia," by Rev. Justin Perkins, p. 408.

† "The climate of Azerbbijan, which encircles the Ouroomia, is said to be the most salubrious in Persia * * * The intensity of cold in the month of December is equal to what is termed a moderate season in St. Petersburg. One morning about the middle of the month the snow began to fall, accompanied by a tremendous wind from the northeast; and before evening, the whole country was covered for several feet in depth. * * * Owing to the long prevalence of frost, the snow became like dust; and when the wind blew it was whirled in clouds like the sand of the desert, filling up every path, high-road or hollow in its way. This inconvenience is redoubled when the snow already down meets accumulation from above. Hence it is considered great rashness to attempt going any distance from the city when either the heavens are loaded or the air is turbulent, for to be caught in any of these snow-storms is almost certain destruction. Many instances have occurred where not only solitary individuals but whole companies and caravans have been overwhelmed and perished."—*Sir Robert Ker Porter*, "Travels," etc., p. 245 *et seq.*

XUM

pearance, riding at his utmost speed, with his horse in a sweat,* calling out to all whom he met, both in Persian and Greek, that the king was approaching with a vast army, prepared as for battle."

The remarkable thing about this is not that the horse should be in a sweat, but that Xenophon should have told us of it. It would be a noteworthy thing now if a horse could be ridden there on the first day of September at a moderate pace and *not* be in a sweat.

The failure of Xenophon to speak of the hot, dry climate in some such way as all modern writers speak of it, may be placed side by side with Arrian's account of Alexander's march through the desert of Gedrosia, where the great heat does not fail to be distinctly recorded.†

The Greeks were no such salamanders as not to notice and speak of excessive heat when they encountered it.

We might compare what is said, too, of the delightful climate and fertility of Karmania, the modern Kerman, as Alexander found it on leaving Gedrosia,‡ with the accounts that are now given of that country.

Or take Strabo's § enthusiastic description of the fertility and productions of Hyrcania, and compare it with what is found to be true at the present time, when barely one-twentieth of the whole kingdom of Persia is under cultivation.

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* Compare the following, written more than twenty-two centuries afterward: "It was one of the hottest rides I ever experienced. There was not the slightest breath of air to dissipate the heat. The dome and minarets of Meshed 'Alí quivered in the mirage. The gravel reflected the sun's rays so powerfully as to cause men and animals to seek for temporary shelter under the scanty shade of the little round towers which at intervals guard the road. Our very dogs howled piteously, being obliged to follow us, lest they should be left behind. Whenever the eye rested for an instant on any object it felt scorched and bloodshot. Our umbrella was useless, for, although it served to break the vertical heat of the mid-day sun, it concentrated the rays reflected from the ground, and afforded a welcome shade to the few flies which were able to exist in such a fiery atmosphere."—*Loftus' Travels in Chaldea and Susiana*, p. 48.

† "The heats were so vehement, and the want of water so great, that many of his men and most of the beasts of burden died."—*Arrian*, Rooke's Translation, London, 1814, p. 111.

‡ See "Rise of the Macedonian Empire," by Curteis, *Scribner*, p. 198.

§ "In Hyrcania, we are told, each vine produces a metrete (near seven gallons) of wine, and each fig tree sixty medimni (equivalent to 90 bushels) of fruit; that the grains of wheat that fall from the husk to the earth spring up

We may take notice, too, that travelers who have studied the history as well as observed the present condition of the land of Edom have remarked that there has been an entire change of the climate there. In the days of Moses, and even of the last of the Hebrew kings, it had its fields and vineyards, its flocks and herds, its water for the inhabitants and their cattle, and its armies of thousands of men. Now, as Dr. Thompson* remarks, it is "the great and ever recurring puzzle to discover by what means these vast flocks and herds could have been kept from perishing with thirst. In the present condition of these lands," he adds, "it could not be done except during the rainy months of winter." And Dr. Payne Smith† remarks that "the Sinaitic peninsula was once a well wooded region. To this day the trunks of palm trees are often washed up on the shores of the Red sea as silent witnesses of rushing floods sweeping down valleys whence water and palm trees have for centuries disappeared." Moses and Joshua encountered hostile armies—the hosts of Amalek—at their first coming out of Egypt; a population that had given the Egyptians an abundance of trouble, as we learn from their monuments; a population that neither have, nor could have, in a national sense, any successors there now.

Do we not see traces of this change for the worse recording itself during the reign of the Caliphs? Why could not the zeal of Haroun Alraschid for learning and art lay as admirable foundations in Mesopotamia, and under his own eye, and perpetuate itself in as splendid achievements there as in the fine climate of Andalusia? Why is not Bagdad as noble in its monuments as Cordova or

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again the following year; that beehives are in the trees and the leaves flow with honey. The same may be met with," he adds, "in the part of Media called Matiana; also in Sacasena and Araxena, countries of Armenia. In these three it is not so much to be wondered at, since they lie nearer to the south than Hyrcania, and surpass the rest of the country in beauty of climate; but in Hyrcania it is more remarkable. It is said that in Margiana you may frequently meet with a vine whose stock it requires two men with outstretched arms to clasp, and clusters of grapes two cubits long."

Aria is described as "sunny and fertile, the wine being richer and keeping perfectly for three generations in unpitched casks. Bactriana, which adjoins Aria, abounds in the same productions, if we except olives."—*Strabo*, as translated for Bohn's Library, Book II., chap. i, sec. 14.

* "The Land and the Book," *Harpers*, 1880, p. 204.

† "Bible Educator," Vol. I., p. 228.

Grenada? Why is it that the great edifice of the famous college that was built there in the same era of enthusiasm as the Alhambra has now sunk to the common-place service of a caravanserai?

Why this failure as compared with the fifteen centuries of the earlier civilization before the days of Cyrus?—those centuries that are now telling us their story in the autographs of their own scribes? A story that is not impaired by the errors of copyists; with no blundering interpolations; no theories of the historian to mislead us; no misrepresentations of prejudice; their achievements buried side by side with their writings; their writing, itself a testimony to their inventive power, preserved for us not in fire-proof buildings and alcoves like those of our time, but in fire-proof books, which remain amid the ashes of that conflagration that could cast them down but could not ignite them. Our books are the most destructible property we have. Theirs were more enduring than the marble of their statues.

The way is now open for us to deal directly with the changes in the physical geography of Asia that go far to account for this difference.

The whole breadth of Asia presents three zones; the first or northernmost of which is the Siberian, and is drained into the Polar sea.

The second, or middle zone, is drained into inland lakes or deserts.

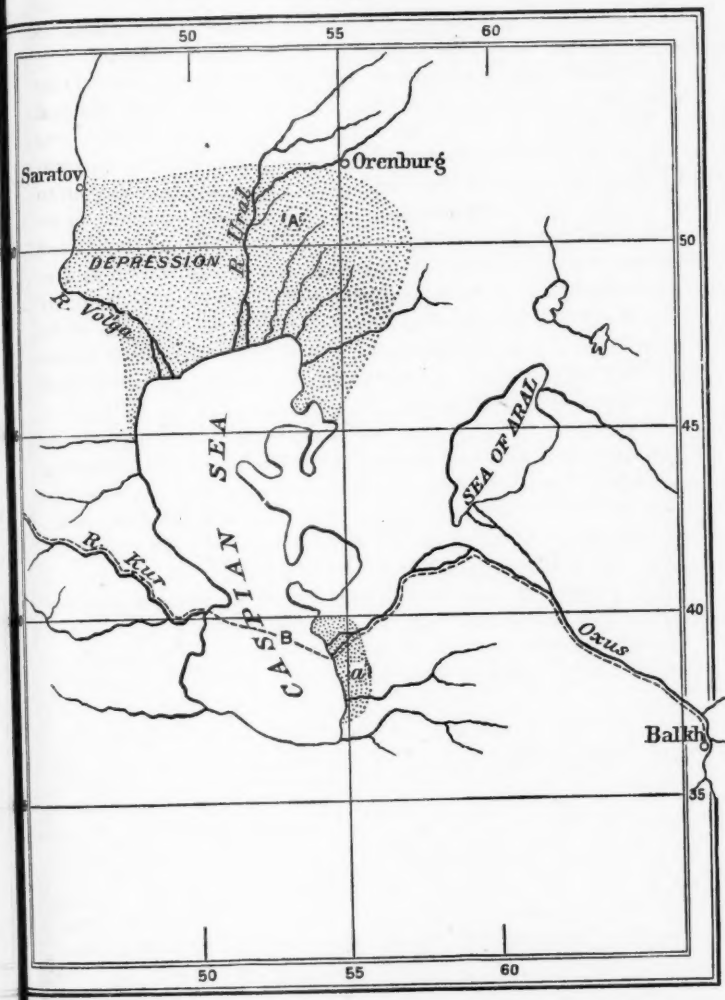
The third is drained into the Indian ocean.

I will preface my account of changes that are *believed* to have occurred with two or three that are regarded as historically certain.

The whole voice of antiquity, without a dissenting word, affirms that the Oxus discharged itself into the Caspian sea;* whereas it

* "Ancient writers would lead us to suppose that in former times this celebrated river was navigable to a much higher reach than it is at present. We can draw no other inference from the accounts given by some of them of the methods in use to convey goods from India to the Black sea. Pliny particularly describes the route. 'Having arrived at Bactra (modern Balk),' he observes, 'the merchandize there descends the Icarus (Jehon river) as far as the Oxus, and thence is carried down to the Caspian. They then cross that sea to the mouth of the Cyrus (the Kur), where they ascend that river; and, on going on shore, are transported by land for five days to the banks of the Phasis (Rion), where they once more embark and are carried down to the Euxine.' (Pliny, Lib. VI., c. 4). Ancient authors all bearing the same testimony, that such was the great road by which Europe received the luxuries of the East, we cannot but admit the fact; but at the same time ocular demonstration assures us that both rivers, the Kur and the Rion, must have sunk very low in their

No. I.



The dotted surfaces A, a, represent areas of depression, where the surface is lower than the ocean level. (See p. 208.)
The dotted line B represents the ancient line of commerce described by Pliny and others, between Bactria and the Black Sea. (See note, p. 200.)

is well known that it now enters the Sea of Aral, 200 miles to the east. Sir Henry Rawlinson, finding no allusion to the Sea of Aral in the antecedent literature of the world, suggests that it may be a creation of the middle ages.

Humboldt came to the conclusion that in Alexander's time it was a part of the Caspian sea.

Upon *either theory*, or upon any theory that respects the uniform testimony of antiquity, we are compelled to admit a physical change here of the highest significance.

The River Volga, which now empties into the Caspian, made its way as late as the fifth century of the Christian era into the channel of the Don, and contributed its waters to the Sea of Azof.

And the Persian gulf is found to recede by the filling in of sediment from the Shat-el-Arab which receives the rivers of Mesopotamia, at the rate of nearly two miles in a century, which carries the gulf back in 25 centuries some 50 miles, and makes it certain that the rivers Tigris and Euphrates once entered it by their own distinct and separate channels. Such changes as these account for some of the discrepancies and confusion of the early geographers, and at the same time suggest that they may not in all cases have been so far from the truth as has been supposed.

Pompey believed the Caspian sea to be a gulf setting in from the northern ocean.* And the conclusion that it once had such a connection is now regarded as established.

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beds, since so important a traffick as that described could have been carried up their streams to such a height as would make the land-carriage from the one to the other only a journey of five days. * * * From the present comparatively shallow state of these two rivers, instead of goods being landed as of old time at a point in the Kur whence they might arrive at an answering navigable point on the Rion after a journey of only five days, they would in our times be put on shore so low in the line of the river as to constrain them to traverse a distance of sixteen days' travelling. * * * Selencus Nicator's project of connecting the Euxine and Caspian seas by a canal, by a union of these two rivers, could not have been conceived at all unless those rivers then possessed more extensive navigable channels that they do at present."—*Sir Robert Ker Porter*, "Travels," Vol. I., p. 112 *et seq.*

It is self-evident that this higher level of the river Kur could not have existed without an equally elevated level of the Caspian.

* "Von Baer has shown that the Caspian was connected with the ocean by way of the White sea, and marks of erosion are now visible on rocks at an altitude of 80 feet above the present water level. These 80 feet corresponded

We must admit, too, that Alexander was probably right in the opinion that he adopted, after he had made diligent enquiry in Hyrcania, that the Caspian sea took a broad sweep around the Caucasus range and became united with the Palus Macotis or Sea of Azof. These sharp, ambitious, military men were pretty apt to get at the truth. There is reason, moreover, to believe* that the polar sea for a wide space east of the Ural mountains formerly extended its area down to the sixtieth degree of north latitude, where it was in communication by means of another strait with the

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exactly with the present level of the ocean; and it is a remarkable fact that no marks of erosion appear between that line and the present level of the waters. This shows that the sinking of the waters by evaporation is a process too rapid to leave any records, and took place after the severance of its connection with the White sea."—*Am. Journal of Science and Arts*, Nov., 1873, p. 396.

In singular agreement with this, Plutarch says, in his Life of Alexander: "He could get no certain information in what manner it (the Caspian sea) was formed, but he conjectured it came from an outlet of the Palus Macotis. Yet the ancient naturalists were not ignorant of its origin; for many years before Alexander's expedition they wrote that there are four seas that stretch from the *main ocean* into the continent, the farthest north of which is the Hyrcanean, or the Caspian."—"Plutarch's Lives," Langhorne's translation, p. 477, smaller edition.

"Of these (gulfs) there are four principal: the northern, called the Caspian, by others designated as the Hyrcanean sea; the Persian and Arabian gulfs formed by the southern sea, the one being nearly opposite to the Caspian and the other to the Euxine; the fourth, which in size is much more considerable than the others, is called the Internal and Our sea. * * All these gulfs formed by the exterior sea have a narrow entrance; those of the Arabian gulf, however, and the Pillars of Hercules are smaller than the rest."—*Strabo*, Book II., chap. v., sec. 18.

It should be noticed, too, how the ancient geographers speak of the territory that joins the region of the Caucasus to Armenia as an "isthmus." Strabo says of the Caucasus: "It is the territory between the Caspian sea and the Euxine, bounded on one side by the Don, the Exterior ocean, and the Sea of Hyrcania; on the other by *the isthmus* where it is narrowest, from the recess of the Euxine to the Caspian."

Observe where he brings in the Exterior ocean; viz., between the Don and the Sea of Hyrcania.

* "After Humboldt's profound investigations in Central Asia, we shall not, at the present day, show too great temerity in assuming that during some portion of the present period a vast strait, like that which once ran along the southern base of the Atlas, extended from the Black sea to the Gulf of Obi and the Frozen ocean."—"The Earth," by Reclus, p. 637.

Hyrcanean sea. There was no stone age in Siberia other than that which now exists there. Much of the country lies low, and there are remains of the ancient sea that are not to be mistaken.*

We are thus brought to contemplate a vast water area—a true Asiatic Mediterranean in the heart of the continent—which, like that at present existing between Europe and Africa, was in communication with the great ocean. The upheaval that excluded the ocean left the waters of this inland sea to their necessary accumulation from the various rivers that were flowing into it.

Then followed the opening of the Bosphorus and the sinking of this great inland sea to the present level of the Black Sea, which is very near the ocean level.†

Perhaps we have a trace of this disruption of the eastern con-

* "Between Tomsk and Tobolsk," says Cottrell, "is a vast reservoir of water known in the language of the country by the name of the Ssor of Laimine; * * a body of water or gulf which has been formed from a lake or river inland. * * It is 80 versts (about 50 miles) from the small town of Surgut on the Tobolsk side, and on the right bank of the Obi. At its outlet it is five versts wide, and when a very strong northerly wind blows, it breaks its embankments and rushes into the Obi with such impetuosity as to impede navigation for some days. Some Ostiaks and Cossacks of Surgut once attempted to explore this inland sea, but after proceeding more than 100 versts, encountered such violence of the waves that they dared not venture further. The inhabitants of Berezof and Obdorsk are acquainted with the Ssor, and say it is 500 versts (330 miles) long.—"Recollections of Siberia in the years 1840 and 1841," by Charles Herbert Cottrell, Esq., p. 83.

† In a communication published in the *American Journal of Science and Arts*, New Haven, 1873, giving "the result of a careful investigation of the rocks of the Bosphorus, by George Washburne," the writer refers (p. 194) to the time when "what now constitutes the paleozoic zone of the Bosphorus, a territory of about 700 square miles, rose above the seas as a single island." During that

EXPLANATION TO MAP NO. II. (Opposite page.)

A represents the great Asiatic Mediterranean, that in ancient times occupied the area of the Caspian, the Aral, the desert of Gobi, the region north of the Caucasus, and the depression shown in Map No. I. (See p. 201.)

B represents the gulf east of the Ural mountains that formerly set in from the Arctic ocean, including the Gulf of Obi. (See p. 203.)

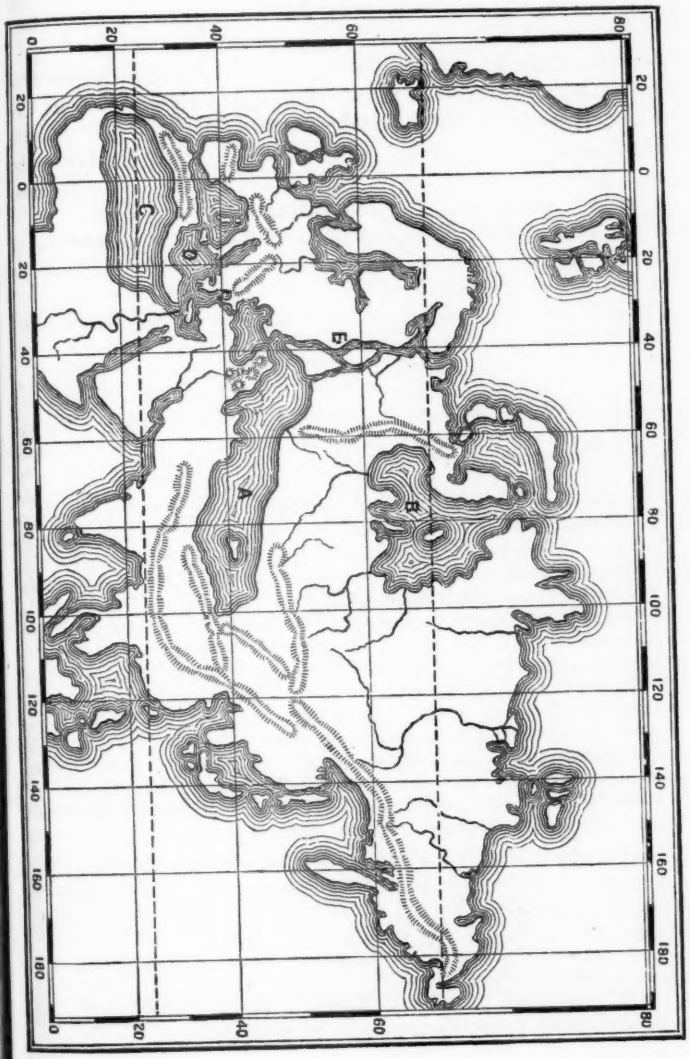
C represents the African Mediterranean, occupying formerly the area of the desert of Sahara. (See p. 208.)

D represents the existing Mediterranean between Europe and Africa.

E represents the channel of navigable water that in early times connected the great Asiatic sea with the White sea. (See note, p. 202).

XUM

No. II.



tinent, by the opening of the Bosphorus, in the 10th chapter of Genesis, where it is said of Eber, the great-grandson of Shem: "There were born unto him two sons; and the name of the one was Peleg: for in his days was the earth divided." Some have referred this to the confusion of tongues; but I may be permitted to point to the constant use of the Hebrew noun "peleg," and of the corresponding verb "p*alag*," both of which occur in this passage.

"Peleg" means everywhere a channel or water-course, and scholars have found here the root of the Greek πέλαγος (sea).

Following this suggestion, which too many writers have hastily dismissed, and anglicising a well-known Greek verb for the occasion, we might read the passage thus: "The name of the one was called Peleg, for in his days was the earth pelagized, or cut by the sea."*

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geological period "the Mediterranean, the Black sea and the Caspian were all one body of water."

The old Paleozoic island was broken up by "a succession of local eruptions, so as to form deep valleys in all directions. The waters of the Black Sea having been cut off from the Mediterranean by the formation of the Thracian peninsula, rose and had to seek some outlet.

"They found their way into one and another of these valleys until they reached the Marmora, which was probably then a lake. The rise in the Marmora cut through the channel of the Dardanelles. "The only thing which makes the problem a difficult one is the existence of the great volcanic domain at the northern extremity of the straits. The channel of the Bosphorus passes through this a distance of more than four miles. How was this part of the channel formed?"—the very question that was asked more than 4,000 years ago (Job, xxxviii., 25).

* In the book of Job, who is believed by many to have lived in the next generation after Peleg (Gen., x., 29), we find the same verb with precisely this meaning; and if the passage had been constructed with special reference to this event the words could not have been better chosen: "Who [hath divided a water-course] for the overflowing of the waters?" (Job, xxxviii., 25.) The words here inclosed in brackets are all used to represent the simple verb פָּלַג. We might translate it, "Who hath channeled for the overflowing of waters."

The very passage that is appealed to in support of the more ordinary interpretation (Ps. lv., 9), critically examined, looks in the other direction—"Destroy and divide their tongues." Literally, "ingulf, swallow down (Sept, καταπόντισον) and whelm (as with a torrent) their tongues," *i.e.*, themselves; the offending part being put, after the manner of the Hebrew psalms, for the whole, as in Ps. lii., 4; Ps. cxx., 3; and Ps. xxxi., 20.

Strabo tells us, on the authority of Diodorus Siculus, that the inhabitants of the island of Samothracia had a tradition of an inundation caused by the sudden rising of the waters of the Mediterranean, which compelled the inhabitants to fly for refuge to the summits of the mountains; and long afterwards the fishermen's nets used to be caught by the columns that, prior to the catastrophe, adorned their edifices. "It is said," he adds, "that the inundation originated in a rupture of the chain of mountains which shut in the valley which has since become the Thracian Bosphorus."

He quotes Eratosthenes as saying of Strato that "he goes more deeply into the causes," * * and was of the opinion that formerly there was no exit for the Euxine, as now, at Byzantium, but that the rivers flowing into it forced a way through and let the waters escape into the Propontis, and thence into the Hellespont; and that a like change occurred in the Mediterranean, for that sea, being overflowed, opened a passage at the Pillars of Hercules." This higher level of the Mediterranean left no alternative but to conclude that the African desert was also covered with water, as

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It seems not to have been noticed by those who explain Gen. x., 25, by Gen. xi., 7, 8, 9, that they have nothing in common but the single word הָאָרֶץ, *the earth;* while Gen. xi., 7, 8, 9, and Ps. lv., 9, which last is proposed as the crucial test, have not in the Hebrew so much as this in common.

"The first king [of the second Egyptian dynasty], Butan, the Greek Boethos, is stated to have reigned 38 years, the most remarkable event of the period being *a fissure of the earth*, probably the result of an earthquake, which carried off many people at the town of Bubastus."—*Ancient History from the Monuments*, p. 27, by S. Birch, LL.D. Scribner, 1875.

Comparing dates, we have: according to Dr. Birch, reign of Butan from 2737 B.C. to 2699 B.C.; according to Sept, life of Peleg, from 2714 B.C. to 2375 B.C. Giving 15 years in which the two were cotemporaneous. The latter probably received his name before he was 15 years old. This exactly meets the case: "a fissure of the earth." We have in history, the tale of many an earthquake; and it is not unusual to find somewhere in the record an account of one or more fissures of the earth. But where is there another example of this curt way of making the fissure tell the whole story? As if the author wished it to be understood that the earthquake was in other respects like all earthquakes; but in this case the unique thing, without a parallel, that which was alone worthy to go into history, was the great "fissure of the earth." If we were allowed to construct the history and fix the dates to suit ourselves, we could not have coined a statement or determined upon figures that would have been more confirmatory of our interpretation.

Erastothenes maintained. This writer tells us of fragments of wrecks that had been found far inland, and were said by the inhabitants of the oases to have come through some opening.

The discussions of the last few years have made us familiar with the fact that a part of the great African desert—the Sahara—is below the level of the ocean. And we know how seriously the question has been debated as to the expediency of opening a channel from some point in the great bay that protrudes into the continent from the Mediterranean southwesterly from the island of Sicily.

The testimony of ancient literature to the fact of the former existence of a great Asiatic Mediterranean, which has for the most part disappeared, is amply supported by modern discovery. We point first to that great area of depression* lying north of the Caspian sea, which is declared in McCulloch's Geographical Dictionary to be "the most remarkable depression† on the face of the globe." We can at once duplicate the area of the Caspian sea with an area of depression here that gives a surface lower than the ocean level. Of course it is lower than the Black sea. Pierce the northeastern barrier of the Black sea and you would speedily convert all this area into the bed of a sea again. But this is not believed to be by any means the limit of this ancient Asiatic sea.

Lenormant says "it occupied the whole bed of the Caspian, and the Sea of Aral covered a great part of the steppes situated between the Ural mountains and the Volga, as well as the country of the Kalmucks, and reached southward to the base of the Caucasus. Its eastern limits are uncertain; but from the observations of travelers, and indications drawn from the annals of China, it appears to have occupied all the desert of Gobi to the north of Thibet."‡

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*The following extract from Prof. J. D. Whitney's carefully written work, a thesaurus of learning for the very interesting field which it covers, published as "Vol. VII., No. 2, Part 1, of the Memoirs of the Museum of Comparative Zoölogy at Harvard College," exhibits a parallel case of depression, though of less area, on our own continent:

"A considerable portion of this area (about 120 miles in length, narrow at its northern extremity, but widening out rapidly toward the south) is depressed below the sea level * * * to the amount of a hundred feet or more. * * * It would appear that the access of the gulf must have been cut off by an actual rise of the land, and not by the accumulation of debris brought down by the Colorado. The entire body of water disappeared by evaporation."

† See Map, No. I. ‡ "Ancient History of the East," Vol I., p. 26.

The elevation of the Sea of Aral (some 250 feet) above the level of the Caspian, and the still greater elevation of the desert of Gobi (some 3,000 feet), create the necessity of assuming either that these eastern bodies of water were not continuous with the Hyrcanean sea, but separate lakes; or else that there has been a remarkable uplifting of this part of the continent. Whichever alternative we take, the argument as regards climate is the same.

Richtofen, who has brought out for us important treasures of geographical knowledge from Chinese sources, both ancient and modern, and who affirms that the Chinese never put anything into their maps that has not a corresponding reality, informs us that the Chinese name for the desert of Gobi means "the dried up sea." This gives us an additional stretch of sea eastward of some 1,600 miles, with a varying width of from 300 to 700 miles. Its range of latitude is almost identical with that of the Caspian sea.

This large body of water must have greatly facilitated the original emigration to China, and will go far to account for the very ancient settlement of that country.

The removal by evaporation* of this ancient excess of water above

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* "The people (of Nowdeh) have a tradition that at some remote period the Caspian covered the plain running into the valley and forming a small bay, along the shores of which was a forest of date palms; the villages on either side of the bay used to communicate with boats and had an extensive trade across the sea."—Paper by Hon. J. C. Napier, read January 24, 1876, and published in the Royal Geographical Journal, p. 111.

On page 117 *id.*, he says of the green rampart of earth, a very enduring structure, ascribed by tradition to Hamza Sultan, but which "may have been as old as Alexander's wall on the opposite shore of the bay, and may have had some connection with it; * * * if of no other interest, the rampart gives very satisfactory proof of the alleged recession of the Caspian sea. The sea flank is now not less than 300 or 400 yards from the water's edge."

"Without questioning the existence of a great sea covering Northwestern Asia in later geological times, there is ample evidence of a subsequent Aralo-Caspian sea that undoubtedly existed in more recent times. This latter sea, the Caspian of history, there are strong reasons for asserting could at the present date be reformed, were it not for the changes which the direction of the rivers formerly feeding it has undergone, and for the consequent diminution of their original volume. * * * The water alone is wanting that formerly filled the basins and flooded the intervening marshes which formed a part of the Caspian sea of the ancients, while the disappearance of this water can be satisfactorily accounted for. * * * Though, therefore, this great desert (the Kizil Kum

the quantum which we now find, has, as we shall presently see, greatly changed the factors of the Asiatic climate.

One thing more I must include in the sweep of physical causes that doubtless operated within the human period. I mean those milder conditions of climate in northeastern Siberia in which the trees (a foot in diameter), which are now washed out from the frozen soil by the river floods, were growing there, and vast herds of mammoths were roaming through the forests and finding ample sustenance there. We must now accept the conclusion as fully sustained that man was cotemporary with the mammoth.* And it is well known that tons of ivory from tusks weighing, in some instances, 480 pounds each, are annually brought into the markets of the world from Siberia and from the islands of New Siberia and Kotelnoi, from 130 to 150 miles distant from the coast. Indeed, there are three distinct instances in which the complete carcasses of mammoths have been found, disentombed from the soil by the summer freshets, in such a state of preservation that the dogs ate their flesh.

Of course their destruction and burial and thorough refrigeration must have been in connection with some terrible cataclysm that brought on an era of intense cold after it.

Some will find this revolution in connection with the Noachian deluge, and some in connection with a later disturbance; perhaps that in the days of Peleg or Deucalion.

At whatever point we place it, it marks the climatic change with sufficient distinctness to call to mind that at one time man's cotemporary, the mammoth, found a congenial home and abundant supplies where the average temperature of the entire year is *now* below the freezing point, and in some localities very near to the zero point, and where these trees cannot grow now even as stunted shrubs. At Yakutsk, 62° north latitude, the Russian-American company in

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desert) was doubtless the bed of a sea in a recent geological epoch, it appears to have been the bed of a marsh within historical times. * * * The causes of the desiccation would be contemporaneous with human epochs rather than with geological ones; and would thus be legitimately included in the physical geography rather than in the geology of those countries."—*Herbert Wood* in the *Geog. Mag.*, May 1, 1876, p. 137.

* "Man as the Cotemporary of the Mammoth and the Reindeer in Middle Europe." Translated for the Smithsonian Institute from "Aus der Natur: die neuesten Entdeckungen auf dem Gebiete der Naturwissenschaften," Leipzig, 1867.—*Smithsonian Report*, 1867, p. 335 *et seq.*

1820 bored for water in the court-yard of their establishment to the depth of 380 feet, and did not get below the frozen crust.* Observations with the thermometer indicated that the actual depth of the frozen ground must be 625 feet.† Here we note the sure progress of the empire of Arctic cold through the centuries. This is one of the elements of the growing change. We shall not be charged with extravagance if we distinctly put forth the claim that there was formerly, and within the human period, a milder climate at the Arctic circle, and of course below it, than now. This alone would settle the point that there must have been a more even climate—a climate of less extremes—in the region of the old cradle of the human race. It takes away the source of those cold boreal blasts that now render the winters of northern Persia so desolate. Thus, as we go back in time, we travel away from those extremes which are so strongly marked in the climate of Central Asia—extremes with which, though in a far less degree, we on the eastern side of this continent are unhappily familiar; for, as Humboldt has put it, New York has the summer of Rome and the winter of Copenhagen, and Quebec has the summer of Paris and the winter of St. Petersburg; and still worse, on the eastern side of the Asiatic continent, Pekin has in summer the scorching heats of Cairo in Egypt, and winters as rigorous as those of Upsala in Sweden.

Let us put these things together. A milder climate in eastern Siberia; a vast gulf‡ of the Arctic ocean, east of the Ural mountains, stretching down below the 60th parallel of north latitude, and the great Mediterranean§ in the heart of the continent, and we have the conditions requsite for a delightful climate for the early home of man. Nature does not accomplish her transitions in a moment.

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* "Annals of the Imperial Academy of Sciences," St. Petersburg, 1837, as quoted by C. H. Cottrell in "Recollections of Siberia," pp. 96 and 97.

† "Travels in Siberia," by Adolph Erman, Vol. I., p. 277. Both these writers are very explicit, and the facts are given at considerable length. It is unfortunate that their works are no longer in the market, and are to be found in very few private libraries.

In 1844 Sir Roderick I. Murchison, then President of the Royal Geographical Society, said of M. Erman: "There can be no doubt that, with the exception of the great Humboldt himself, it would be difficult, if not impossible, to find a single man in the broad field of explorers not already honored with our medal who is more richly deserving of it."

‡ B in Map No. II. § A in Map No. II,

There is ample time, especially if coming discoveries should favor the longer chronologies and the extending of the pre-historic era of man's existence, for greater changes than have been now suggested. There is no lack of time, even if the shorter chronology more familiar to the popular mind be adopted.

We come now to contemplate those atmospheric laws and conditions that enter into the question of climatic change.

It has been said that the cooling of air that has been saturated with moisture has the same effect as the squeezing of a sponge, it being a well-known law that its capacity for moisture increases as its temperature is raised, but in a greatly enlarged ratio. As the heated air from the south strikes the base of a mountain range it of course ascends the slope to the cooler regions above; the pressure of the current behind forces it up. As it rises it parts with its moisture much more rapidly than with its heat. In other words, it becomes very dry. The mountain range becomes a most potent condenser of the water that was held in invisible vapor and sends it down in torrents and rivers to the sea. This effect is produced on a large scale by the Himalaya mountains. It is also produced by the upward movement of the air, independently of mountain barriers. Hence the air in the upper regions, and especially in the upper Arctic regions, descends upon the earth as a very dry air. As it moves toward the south and grows warmer, it acquires an intense desiccating power. It absorbs moisture and does not give it back to the earth. This is especially true as regards the region now under consideration.

It is part of *"a rainless belt that includes the whole of northern Africa except Tunis and Algeria, the northern half of Arabia, the most of Syria and almost the whole of Persia—a zone of an average breadth of 900 miles, where rain is altogether absent or of rare occurrence. With a narrow interruption where the Himalaya chain passes into the Hindoo Koosh, which includes Afghanistan and the Upper Punjab, this zone is prolonged northeast through Thibet, Upper Tartary and into Mongolia, covering the desert of Gobi or Shamo. It is thus broken into two great rainless districts, the one of 3,000,000 and the other of 2,000,000 of square miles."

* Sir J. F. W. Herschell, in "Enc. Brit.," eighth edition, Vol. XVII., p. 614. Most of this statement in regard to the trade winds is abbreviated from Sir J. F. W. H.

In the great atmospheric movement from Siberia toward the sun, when the latter is vertical over the burning plains of Hindoostan and Arabia and the Sahara, we may observe that there is a wide sweep, a belt of 1,600 miles, that passes over the desert of Gobi, one of the most arid and desolate of all the ill-conditioned solitudes of the globe, fully rivalling all the horrors of the Sahara, in Africa. "The trade winds, as they are called, that draw in from the north over this desert in the summer bring no rain. On the contrary, they are exceedingly dry, and have a most intense evaporating power; and in the winter the anti-trade winds are cut off from affording any rain by the barrier of the Himalaya mountains." Hence, whatever transverse currents may come from these desert plains and terraces of central and eastern Asia can have no ameliorating effect upon the great wind-current that sweeps down across the Aralian and Caspian seas and the desert of Khiva. This wind-current is the potent instrumentality that is working out the deterioration we are contemplating. Here we encounter in its incipiency that wind from the north that the Arabs call Shirmal, and which so many writers declare to be more like the blast from a furnace than like any air that was made for man to breathe—a wind the worst quality of which we do not read from the scale of the thermometer. We must take account of it in some such way as this.

It is a wind that drinks up all the water that is poured into the innumerable salt lakes and marshes that are not drained into the Arctic ocean, and all the water that is poured into the Caspian sea and the Sea of Aral, neither of them having any outlet; the Caspian sea itself having an area of 180,000 square miles—an area exceeding that of the States of New York, New Jersey, Pennsylvania, Maryland and Virginia, with all New England, except Maine, thrown in; a sea extending through nearly 10 degrees of latitude, as far as from New York to Savannah, and receiving by the rivers that pour into it the drainage of between 600,000 and 700,000 square miles of territory. It is a wind that drinks up all the water that is poured into the Caspian by the Kuma, the Terek, the Aras, the Kur, the Sefid, the Attruk, the Ural and the Volga—the Volga alone receiving, in its course of 2,000 miles, the influx of 37 navigable and 153 unnavigable tributaries, and all that is poured into the Aral by the Oxus and the Jaxartes; and yet it grows more thirsty as it sweeps

on, drinking up all the water that is poured into the Mediterranean from the Nile, from the water-sheds of Northern Africa, Spain, France, Italy, Greece, Asia Minor and Syria, all that comes from the Black sea, and, as it is estimated, more than two-thirds of that which is poured in from the Atlantic through the Straits of Gibraltar. And still these winds are not satiated; they sweep on across the Sahara to the Atlantic, sparing no rain for earth or ocean, till they approach the equator, and pass, by an upward movement, to the higher regions of the air.

The Caspian sea, with all its revenue of waters from its many tributaries, is said to be steadily diminishing, or, in other words, drying up; and it is quite obvious that the process is adequate to account for the disappearance of that great inland sea which still remained after the opening of the Bosphorus. Given, these thirsty trade-winds, with no adequate compensations, and it must be only a question of time whether Central Asia should become a desert.

Let us now reconstruct the map of Asia in the light of what the most eminent physicists have taught us; let us bring down the Arctic ocean, over Western Siberia, to the parallel of 60° N. latitude; let us fill the great basin north of the Caucasus, restore the whole vast Asiatic Mediterranean stretching away to the confines of China; and then let us make the final addition of the great African Mediterranean that skirted the base of the Atlas Mountains,—and I need not stop to point out at length the elements of salubrity and physical comfort and strength and longevity which almost inevitably come with the change. There would be the difference which there is between the air that comes from the sea and that which comes from a vast surface of land; there would be the regulating and equalizing influence of great bodies of water; there would be the more ample resources of moisture for the air, and the consequent dew and rain; there would be the salubrity of the sea over vast surfaces where there are now miasms and other unwholesome influences of marshes and decaying vegetation. In short, there would be something of the change which there is in passing from a climate of extremes to one where the range of temperature falls within moderate limits. There would be an approach toward what is called an insular climate, such as is now enjoyed by a large portion of Europe. The difference may be made intelligible by a comparison of Greenland with Lapland, the former being colder in latitude 60° than the latter

in latitude 72°, and that for the reason that Greenland at 60° N. latitude has an immense stretch of frozen territory spreading away toward the north, while Lapland borders on a vast surface of water instead.

To prevent confusion, it should be remarked that the argument adjusts itself to a sliding scale of climatic changes, but seems to require a recognition of two distinct stages, which we may designate as the prehistoric and the historic stages.

In the former we see the climatic factors operating with their most benignant effect; an immense surface of water to windward and an atmosphere vastly nearer to the point of saturation with aqueous vapor; a close approximation to an insular climate.

In the latter a diminished and diminishing water area, though greatly in excess of what now exists, and a corresponding advance in the heat and dryness of the atmosphere. Less water surface and a more thirsty air, yet far enough from the present condition of things to admit of the Mesopotamia, the Persia and the Idumea of twenty-five centuries ago.

Any one who has read what the best observers and the highest scientific authorities have said of the uncertainty of all *a priori* conclusions drawn from the power of the discovered forces and ingredients of the atmosphere in any given locality, unless sustained by admitted results, will at once appreciate the method and strength of an argument that takes in well-defined results on a scale that is more than national and covers a range of a hundred generations.

With this test of unquestioned history in mind, let me say a final word upon the proved tendency of an insular climate in the temperate latitudes to produce an aspiring and dominant race of men.

Such was the climate of Greece at the very time that Central Asia was beginning to succumb to the deteriorating process I have described. And there was no power to execute the menace of Xerxes in the millions of his armed host; no power to conquer the ten thousand led by Clearchus and Xenophon; no power to turn back the hardy troops of Alexander.

After the days of Darius, the father of Xerxes, the armies of Asia found a Marathon or a Platæa wherever they encountered the Greeks.

And where shall we look for the center and home of the dominant forces of our own day? Where dwell the people that have

carved out an empire of hundreds of millions of souls from the continent of Asia, and are successfully ruling the very realm from which Alexander was compelled to turn away? Where dwell the people who have grasped the great Australian empire and rule through all the southern seas?

Where dwell the people that hesitated not to move up their fleets toward Constantinople two years ago and say to the conquering Russians, "Hitherto, but no further"—the power that is ready any day to take the troublesome Turk off from the hands of Europe and govern him for the benefit of the world?

Where dwell the people that come nearest to dominating the whole eastern world, and through their descendants *are* dominating this western world?

The answer carries us to that narrow insular realm, of less area than the single State of Missouri; or, if we take in Scotland and Ireland, of less area than the two States of Missouri and Illinois, and less than half the dimensions of Texas.

There is certainly something in that insular climate—something in that atmosphere which so obviously derives its peculiarity more from the water than the land—that imparts a special toughness to the fibre of character and a wonderful power of endurance and control. We have approached something like this as we have travelled back along the line of the geographical and historical changes in the heart of Asia. This discussion raises many questions, of course, which we have had no time to consider. But it may be modestly hoped that it points in the direction where the key is to be found.

The lines of history have not run independently of the changes that have written themselves on the face of the Asiatic continent and made themselves felt in its atmosphere.

On the conclusion of the foregoing paper, a vote of thanks to the Speaker having been moved by Hon. Edwards Pierrepont, a classmate of the Speaker in Yale College of the class of 1837, and seconded by Rev. Dr. Roswell D. Hitchcock, Vice-President of the Society, was adopted unanimously.

THE RECENT EXCAVATIONS AND DISCOVERIES AT ATHENS AND OLYMPIA.

BY

THOMAS DAVIDSON, M.A., OF BOSTON.

It gives me great pleasure to address you to-night on the subject of Greek Archæology, because it shows me that a good deal of interest is being felt in the discoveries that are more and more disclosing to us the ancient world as something better and more human that we have been accustomed to think it. If I can contribute one iota to increase that interest I shall feel richly rewarded; for I am very desirous that it should become strong now, while it may yet lead to tangible results. The result which I should most gladly see realized would be the establishment of an archæological school in Athens, or Constantinople, or Smyrna, with sufficient funds, a competent scholarly director and two definite aims: *first*, that it should form a standing excavating committee; and, *second*, that it should give practical instruction to young archæologists and supply our universities and museums with men fit to take their place alongside the archæologists of foreign countries. At present we have only a very few such. Only thus can Greek archæology ever become a serious branch of science among us. What Germany and France have done with such success and incalculable profit we can surely afford to do. But we must begin now, while Asia Minor and Crete, those almost undisturbed store-houses of history and art, are still in Turkish hands, and we can obtain the results of our researches. Gen. di Cesnola has shown what energy can do in the way of opening up treasures of art and knowledge hitherto undreamt of. Thanks to him, New York now owns the most valuable archæological collection in the world. But Crete and Sardis are still untouched. I am convinced that an investigation into the ruins of Sardis and the cities of Lydia and Lycia will help us to solve more vexed ethnological, philological and mythological questions, than all the treasures of Nineveh, Babylon and Thebes. The great civilization of the Hermus, to which that of Etruria stood in the same relation as that of Carthage did to that of Tyre, is the missing link in the history of antiquity, the link whose lack leaves the Etrurians a problem and the mythology of the Greeks a congeries of unexplained fables and symbols.

I have undertaken to-night to read a paper on the recent excavations at Athens and Olympia. I discovered, when too late, that I had chosen too vast a subject, and that an account of the discoveries

at either place would have been more than enough to occupy the time at my disposal. In order, however, to keep my promise, I will say just a few words upon the recent discoveries at Athens and then devote the bulk of my paper to Olympia. I was warned, when I lectured once before in New York, that I must steer clear of rhetoric, as that art was not held in high esteem in this city, and that I must confine myself to the relation of facts. I never lectured with such a feeling of comfort as I did that night. As I have not forgotten the experience, I propose to give in as brief a way as I can, and without rhetoric, a simple relation of facts. I am going to take you to Athens and Olympia and be your guide through the recent excavations as I was guided by kind friends two years ago. With the help of illustrations, I may be able to give a notion of how the excavations look, and what has been obtained from them.

And first a few words on Athens: The south side of the Athenian Akropolis was in ancient times occupied mainly by the Odeion of Perikles, the temple and theatre of Bacchus, and later by the Odeion of Herodes Atticus. The ruins of the theatre were laid bare nearly twenty years ago; those of the Odeion have never been below ground. Between the Odeion and the theatre was a space, of which, until recently, almost our only knowledge was derived from a brief passage in Pausanias. That author tells us that in going from the theatre to the entrance of the Akropolis he passed the grave of Kalos, the temple of Asklepios, with its statues and paintings, the grave of Themis with the tomb of Hippolytos, the temple of Aphrodite Pandemos, and lastly, temples to Ge Kourotrophos and Demeter Chloë. These were the things which the Greek Archæological Society, when it began to excavate in 1876, expected to find. The Germans had attempted excavations many years before and came to the rash conclusion that there was nothing there. The Greeks were more successful, laying bare a long platform on three different levels, stretching all the way from the theatre to the Odeion. This platform had been artificially made by cutting away the rock of the Akropolis perpendicularly behind, and building a wall of support in front. I am inclined to think that this wall is part of what was known as the Pelasgic wall. Behind this platform was found a bell-shaped cave, probably the grave of Kalos, the pupil and nephew of Daidalos, thrown by that distinguished artist from the top of the Akropolis in a fit of jealousy. On the platform were found ruins of temples, porticoes and churches, wells, cisterns, pottery, statuary, reliefs and numerous inscriptions. Whether the temple of Asklepios has been found, is

doubtful. Its site is clearly shown by a mass of votive tablets found all in one place. These tablets, which belong to different periods, some dating as far back as the Periklean time, are extremely interesting.

To the surprise of the excavators, there were found under and against the supporting wall the ruins of an extensive portico, connecting with the Odeion of Herodes, and running almost the whole way to the Dionysiac theatre. It was built of blue Hymettian marble, had a range of square columns running along the middle, and one of round columns in front. No ancient author furnishes us with even the name of this huge building, but it was probably built about the same time as the Odeion. Time forbids me to enter into the details of these excavations. I must add, however, that the results bear out the opinion of Thucydides, to the effect that the original Athens lay to the south of the Akropolis.

OLYMPIA.

Of the numerous discoveries recently made in Greece, none are more important from an artistic point of view than those recently made on the site of ancient Olympia, under the auspices of the German government. The researches which lead to these discoveries were begun in 1875, and have been continued, with only such interruptions as the malarious seasons occasion, up to the present time. The German government deserves much credit for the manner in which it has conducted this investigation. The arduous nature of the task they undertook is shown by the fact that the French commission, which set about it in 1829, gave it up in despair after having discovered very little more than the foundations of the temple of Zeus, the remains of which are about 23 feet under the surface. To the credit of the Germans it must likewise be remembered that they have worked purely in the interests of science, inasmuch as they obtain none of the objects found, nor any advantage except the right of first publishing accounts, photographs or other representations of them. The Greek government claims all the things discovered, and intends, it is said, to build a museum for them at Olympia. Before entering on a description of these discoveries, it will be necessary to say a few words respecting Olympia and its history.

Olympia was the name given throughout antiquity to a shrine of Zeus, standing in Western Elis, about ten miles from the sea at the conflux of the Kladeos with the Alpheios, and close at the foot of a hill called Olympos. To the south was the Alpheios, to the west the Kladeos, to the north the hill of Olympos, a mere spur of the

Kronian range, and to the east the long plain of the Alpheios. The situation, though now swampy and in summer very unhealthy, is extremely beautiful, reminding one of that of some of the villages on the Arno above Florence. The view from the hill of Olympos, along and across the valley of the Alpheios, is enchanting.

The Olympian shrine was the most important in the Hellenic world, surpassing even that of Artemis at Ephesos, that of Poseidon at Mykale, and that of Zeus at Dodona. From very small beginnings it rose to be the hearth and centre of the Hellenic world. Like the great shrines just mentioned and many others, it was not closely connected with any town, nor was there even a village near it. It was rather a lonely shrine, at which many towns or tribes, in early, troublous, belligerent times, met on common ground to enjoy the peace of God, settle their difficulties or make plans for common ends.

It is not always easy to account for the origin of such institutions. Possibly the spot was first rendered sacred by being struck by lightning—touched from heaven, as the Romans said—for Zeus, the god of the sun-lit sky, was supposed to manifest his presence by the thunderbolt, and where it struck he was supposed to have taken possession. That these sacred spots should be chosen as meeting-places by neighboring tribes seems most natural, since all recognize the power which resides in the great phenomena of nature.

It would seem that at a very early period the peoples that assembled there settled their differences or claims to manly superiority, not by fighting or duelling, but by running races, and he that could run fastest was considered the worthiest man, and the people he belonged to the worthiest people.

This institution is said to have been founded by Herakles, which means that the Phœnicians, having a trading-post on the hill of Olympos, drew the neighboring tribes to an annual market. It did not rise into great importance till 776 B.C. That Pelops had something to do with it, we may be sure: his legend, as we shall see, is very closely mixed up with the Olympic games. However, their real prominence dates from the time when they were established upon a firm basis by Iphitos, king of Elis, and Lykourgos, the great Spartan law-giver, who doubtless expected by means of them to make Sparta the most influential power in Greece. Sparta always knew the value of organization for political purposes. At all events, the Eleans claimed that the first victor at the Olympic Games was their countryman, Koroibos, who conquered in 776 B.C., and this date was used by Greek writers from the fifth century B.C., onwards, as a sort of era to fix the date of other events.

From 776 onward, the games were celebrated every four years, in midsummer. As early as 740, the Olympic festival had attracted a considerable number of people from all parts of the Peloponnesus, and twenty years later we find it frequented by Corinthians, Bœotians, and Athenians from northern Greece, and even by the Smyrnæans from Asia Minor. Up to about this time, the only game had been a simple race in the Stadion, which, as the name implies, was a furlong or about 600 feet (200 yards) long. Now, however (724), a second and longer race was added, the δίαυλος or double race, and shortly after 720, the δόλιχος or long race, as we should say, the mile race. About 708 was introduced a class of games wholly new, the wrestling match, and the so-called *Pentathlon*, including jumping, running, quoit throwing, javelin-casting and wrestling. In 688 came boxing, and in 680 racing with chariots, which gave great splendor to the games, by allowing rich men to exhibit their horses and chariots, and, so to speak, compete with each other in wealth.

In 648 the single horse race was introduced, together with the *Pankration*, or boxing and wrestling combined. Other games, such as races between boys, which led to a great deal of abuse, were introduced from time to time.

Aristotle, the great statistician of antiquity, in order to show the evils of over training in boyhood, made out a list of all the victors of the Olympic games, which proved that in 450 years only three cases had occurred of the same person's conquering as a boy and as a man. Of course, with the increase of games, additional time was required for their celebration. Up to the Persian wars, the festival seems to have occupied but one day; after that time it occupied five days. Not only was this the case, but the number of buildings, permanent as well as temporary, and the number of statues and other votive offerings, was continually on the increase. The larger of these were placed in the open air, and the smaller either in the temples or in special buildings erected for the purpose. To protect the former, a wall was built round the sacred ground, thus forming what, in local Greek, was called the Altis or grove. Everything of a strictly sacred character, temples, altars, statues, votive offerings, was within the enclosure; everything relating to the convenience of the persons competing at or attending the games was outside. In order to obtain a bird's-eye view of Olympia, let us ascend the hill to the west of the Kladeos, on the top of which now stands the village of Deuva, and looking northeastward and up the Alpheios, let us settle the position of the main buildings. To make the matter easier, let us transport ourselves back to the time of the

traveler, Pausanias, that is to the end of the second century of our era, and let us try to see the Olympia he saw. I need hardly say that it is to Pausanias that we owe nearly all we know about Olympia. But for him, we should not have been able to identify anything. To our left is the hill of Olympos, crowned with a small temple. At the foot of the hill is the theatre, wherein scenic representations seem to have been given during the games. To the west of the theatre is the Prytaneion, where the prytaneis or commissioners of the Elis held their sessions during the games. In front of the theatre were the dwellings for the use of the athletes, who often trained there for ten months previous to the games. This training was done in the Gymnasium, which lies west from the Altis, and is by far the largest building in the plain. It consisted of a long building, possibly for exercise in bad weather, in front of which was a great quadrangle, with an open portico all round, and behind dressing rooms for the athletes.

Directly south of the gymnasium is a building which we shall probably be correct in identifying as the workshop of Pheidias, mentioned by Pausanias. It has almost exactly the same proportions as the cella of the temple of Zeus, faces exactly the same way, and has a large door toward the east. As the Greeks always prepared art works with special reference to the place they were to occupy, we need hardly wonder that a copy of the temple cella was built for Pheidias to fashion the most famous of his statues in. When finished, it was doubtless carried through the great door-way. The building was afterwards used as a sort of temple to all the gods at once, and contained an altar. In the middle ages, its site and foundation were occupied by a Byzantine church. To the south of the Altis are a large number of buildings, far more, indeed, than had been suspected. Near to the river is a long hall, stoa or portico, doubtless intended for the accommodation of visitors to the games. These halls appear in all places to which pilgrimages or sacred embassies were made. One may obtain a very excellent idea of how they looked and how they were used by visiting the Church of the Virgin of Good Tidings, *Εὐαγγελίστρια*, in the island of Tenos, during a festival. Tenos is in sight of Delos, and much of the great portico at Tenos is built of marble from the portico at Delos. Between the portico and the great entrance to the Altis, is the Bouleuterion or council hall of the judges of the games, in which all oaths were taken and all business connected with the games transacted. At the outer southeast corner of the Altis is what the excavators call Leonidaion, the club-house of the Romans. It does not entirely correspond to the description of Pausanias.

Let us now descend from our height, and enter the Altis by the main or festal gate, which was on the south side. The Altis had at least four gates—two on the west, one on the east, connecting with the stadion, and one on the south, by which the processions entered. Let us enter with one of these processions. To our left, as we approach the great propylæa, we shall find the λεσχαῖον club-houses of the sacred commissions sent from the various cities that took part in the games. The whole spare ground between us and the river is occupied by booths and people buying and selling. Here sandal-wood from India is sold alongside amber from the Baltic. The passage through the propylæa conducts us to the foot of a stair leading to the platform on which stood the temples and most of the statuary. To right and left there is a forest of art works of all kinds, and directly in front of us is the great temple of Jupiter, one of the largest and certainly the most famous in Greece. It was built about the year B.C. 580, out of the booty which the Eleans took from the Pisans, when they destroyed their city and obtained definite possession of the Olympian shrine. Before that time, the Altis contained no temple to Jupiter. He was worshiped there, as everywhere, by sacrifices offered on an altar beneath the open sky, he being the god of the sun-lit expanse of the sky. Even after the temple was built, all the great sacrifices continued to be offered on the great hypæthral altar, of which I shall speak presently.

The erection of the temple seems to have been begun shortly after 580 B. C., and to have been finished before the middle of the century. The architect was Libon, a native of Elis, and his material was a coarse native stone, overlaid with stucco and profusely painted. The decoration, apparently, was not begun until towards the middle of the following century, when the deliverance from Persia induced the Greeks to be lavish toward the gods, to whom they owed the immense barbarian booty. Persia supplied the means to celebrate her own defeat. It was near the beginning of the Peloponnesian war that Pheidias, treated with ingratitude by the Athenians, went to Olympia at the call of the Eleans, taking several of his pupils with him. He seems to have been preceded by his rival Alkamenes, as well as by Paionios, of whose works we shall speak in time.

The temple stood upon a raised platform, had, like all temples to the gods, three steps, and was what is technically called a hexastyle peripteral temple. Its length on the uppermost step was 210.3 feet, and its width 90.9, *i.e.*, roughly speaking, 70 yards by 30. On the lower step, the breadth was 97 feet. The breadth of the cella was 43.4

feet, and its length a little over 94 feet. The height of the columns was 34.2, and their average diameter at the base a little over seven feet, at the top 5.6½ inches, the corner ones being three inches thicker. Thus the proportion of height to diameter was as 4¾ to 1, while the diminution toward the top was considerable. The proportion of columns to entablature was as 5.2. The height of temple to the akroterion was about 68 feet. On the corners were gilded vases, and on the top of the pediment a victory with a wreath.

Both pediments contained groups, of which I shall speak hereafter. The main entrance was of course toward the east. Inside the cella were two rows of double columns, with galleries at the height of the top of the first. This is the only temple known to have had galleries. That the temple was lighted from the roof, we know, but how, is one of the vexed questions of architecture. Unlike the Parthenon, the temple had no outer frieze and an inner one only on the ends. In this the deeds of Herakles were represented, probably by native artists. Like all other great temples, its decorations were a history of the worship to which it was devoted. The procession we are following would no doubt pass round the eastern end of the temple, and make its way to the great ancient altar, the centre and hearth of the whole institution, as well as of Helias itself. In doing so, it would pass among other things the beautiful victory of Paionios, of which I shall speak by and by.

Beyond on their right, against the eastern wall of the Altis, was the painted porch and the Leonidaion, doubtless containing frescoes, similar to those in the famous painted porch at Athens. The great altar stood near the middle of the Altis, about half-way between the temples of Zeus and Hera. It had a base of stone about 30 feet square, and the rest of it was made out of the burnt thigh-bones of the animals offered in sacrifice, a layer being added every year. In the time of Pausanias the altar was 23 feet high. On the altar sacrifices were offered every day for more than a thousand years. Leaving the great altar, and proceeding on toward the temple of Hera, we should pass on our left the Pelopion or shrine of Pelops, which, even till late times, contained columns of his palace. This palace may have been used as a sort of temple to Zeus before the great temple was built, just as at Athens the palace of Erechtheus became the first temple of Athena Polias.

The temple of Hera is perhaps the most curious structure in the Altis, and unlike any other known temple. It is hexastyle peripteral, but instead of having 13 columns on the side, like most other temples of this sort, it has 16, an even number. *When* this temple was built, is not known ; but it is certainly older than the temple of

Zeus. It may have been erected when the worship of Hera, the special divinity of the Argives, was introduced into Elis. At all events, this long narrow building is erected against the foot of the hill. When Pausanias saw it, it had one of the outer columns of wood. Most of them were of rough native stone, covered with stucco, painted and sadly cut up to admit votive tablets. A curious circumstance relating to these columns, we shall mention hereafter. In the time of Pausanias, it seems to have been a kind of museum, containing among other things the famous chest of Kypselos and Hermes recently found almost in place. The temple does not seem to have had either pediment groups or friezes. Indeed, even the entablature seems to have been of wood. In the interior were two rows of columns.

Close by the Heraion was the Philippeion, a circular building erected by Philip of Macedon, at the time when he was strong enough to compel the Greeks to admit him and his people to the Olympic games. It contained chryselephantine statues of himself and family, by Leochares. The easily recognized curved stones of this building were found by the excavators scattered all over the Altis and some even outside of it.

Near the main front of the temple of Hera was the so-called exedra of Herodes Atticus. I need hardly say that this Herodes was the famous Athenian rhetorician of the second century, the richest man of his day, the same who built the marble Stadion at Athens, considered one of the wonders of the world, and the Odeion, still standing for the most part at the foot of the Akropolis. An exedra properly means a niche containing stone seats. There are several of them at Delphi cut out in the solid rock. But the word was also, it seems, used to mean a sort of niche-like building erected to cover statues or groups and protect them from the weather. It was, I believe, in such an exedra that the Venus of Melos was found. At all events, there can be no doubt that this was the purpose to which the exedra of Herodes was put. Connected with it was a cistern supplied by two pipes, and furnishing water to the whole Altis. At the two ends of the cistern were small temple-like buildings, probably containing statues of Herodes and his wife, Regilla. No fewer than 14 statues and a cow presented by Regilla were found in this exedra.

In a line with the exedra, on a platform, stretching toward the Stadion, was a row of treasure houses belonging to different cities,

many of them containing untold wealth, which the over-crowded temples could not contain. In front of these houses was the Metroön or temple of Kybele, Mother of the Gods, a small building, appropriately enough used in Pausanias' time as a museum for statues of Roman emperors, who pretended to be gods. In a line with this temple was a row of 16 statues having quite a curious history. They were called Zanes and were bronze statues of Jupiter, made out of the coin collected as fines from those athletes who cheated at the games. Judging from the number of the statues, cheating must have been pretty common, in spite of the fact that every athlete was obliged to take an oath to act fairly. As the price of sin was accursed or devoted, the only thing that could be done with it was to make statues of it, to perpetuate the infamy of evil-doers. These are the chief buildings mentioned by Pausanias of which the ruins have been found. We will now look at the ruins.

If the excavations at Olympia have helped to solve many questions in connection with Greek architecture and to give us an idea of the greatest of Hellenic shrines, they have also added much to our knowledge respecting the history of Greek sculpture, solving some problems and suggesting others. They have brought to light art-objects belonging to many centuries, some dating far back before the building of the temple, some coming down into late Roman times. The small clay and bronze figures of early date are not unlike those found by Gen. di Cesnola in Cyprus, and may belong either to the Phœnicians or the earlier sea-going race that preceded them—possibly the Tyrrheni, called in the bible Tarshish and by the Romans Etruscans. Belonging to a later period there are bronze articles, reliefs and other things of larger size. From an early period of Hellenic art came heads of Jupiter of the type idealized by Pheidias, a type utterly unlike that which afterwards became most common and of which the most famous known copy is the Otricoli Jove. The latter type was developed late and probably by the Pergamian or Rhodian school. The early type was reverted to in Roman times, as we may see from the so-called Talleyrand Jupiter in the Louvre. Though a history of Greek plastic art might almost be written with the help of the Olympia discoveries alone, we must limit our attention to a few of the more important of them —viz., to the external sculptural decorations of the temple of Zeus, the Victory of Paionios and the Hermes of Praxiteles. Of the

sculptures belonging to the temple, the most important are the two pediment groups. Pausanias informs us that the one of them, viz., that over the eastern or main front, was the work of Paionios of Mende, and the other the work of Alkamenes, the celebrated rival of Pheidias. Naturally enough, archæologists were greatly interested to find the works of these men, in order by comparison to see wherein the advances made by the great master really consisted. Both groups have been found, broken and battered indeed, but yet in a state which enables us to obtain a correct enough idea of the mode of treatment and the technic. It is not too much to say that the expectations of the archæologists have been grievously disappointed. While there is no special reason to doubt that the drawings of the groups were made by the artists to whom Pausanias attributes them, it is entirely certain that they were executed in stone by native artists of a very inferior grade. In a word, the groups are clumsily, rudely and in almost every way badly executed. There is no appreciable difference in technic between the two groups. Both contain figures without animation, faces without expression, leathery drapery that contains no limbs and only saves the artist trouble. Some of the faces, to be sure, are not deficient in beauty, especially the female ones; but this is characteristic of all Greek art not Dorian. The truth seems to be this. While Pheidias was engaged on the great works for the Athenian Akropolis, the Eleans sent to Athens for artists to adorn their temple. Alkamenes and Paionios, sons of Athenian colonists, the former from Lemnos, the latter from Mende, answered the call. Not having been schooled by Pheidias, he apparently could not employ them. At Olympia, the artists found only common stone-cutters, very different from the skilled workman to whom, as we know, Pheidias could confidently entrust the execution of his great designs. Pheidias probably never raised a mallet on any marble work connected with the Parthenon. At Olympia, the artists had to do the best they could with the men at their disposal, and sometimes lend a helping hand themselves, especially on the faces of their principal figures. The original designs seem to have had considerable merit. The eastern group, undoubtedly the more important of the two, was designed by Paionois. It represented the start in the chariot race between Oinomaos and Pelops. The legend is well known. Oinomaos, King of Pisa, in whose territory was Olympia, having been divinely warned that he should perish by the hand of his son-in-law,

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tried to prevent his only daughter, Hippodameia, from marrying, by letting it be known that he would give her only to a man who could conquer him in a chariot race. Many brave spirits tried, failed and were put to death. At last came the crafty Pelops, of Asiatic origin, and accomplished by cunning that which could not be reached by fair play. He bribed Myrtilos, the charioteer of Oinomaos, to remove the lynch pin from the wheel of his master's chariot. The expected result followed. In the race the chariot of Oinomaos broke down, and he himself was thrown out and killed. When Myrtilos claimed his reward from Pelops, the latter hurled him from a rock into the sea, and for his pains received that curse which followed his family for generations until it at last extinguished it. Pelops obtained by his suite not only Hippodameia, but also Pisa and with it Olympia. It was on this result that the Eleans, whose hero Pelops was, in after times based their claims to the ownership of Olympia; hence their desire to give the representation of the race, the origin of this claim, a prominent place in the temple. Paionios' design was simple. In the midst of the pediment stood Zeus, gigantic as being a god. On his right and left were the competitors, with their chariots, charioteers and grooms, and on the extremities reclining figures of the divinities of the rivers Kladeos and Alpheios, between which the plain of Olympia and the scene of the race lay. Behind Oinomaos is his wife Sterope, and to balance the group Hippodameia is placed beside Pelops. The design closely resembles the Pheidian one, representing the contest between Athena and Poseidon in the western pediment of the Parthenon. We shall pass the different figures rapidly in review merely to show the nature of the work and how it differs from that of Pheidias.

The Alkamenes group, which occupies the western pediment, represents the battle between the Centaurs and Lapithæ, at the wedding of Peirithoos, king of the latter. The suitability of this subject for a temple of Zeus is by no means apparent. There is no other known pediment group of this same subject, though there are at least a dozen friezes devoted to it. The Lapithæ are the embodiment of settled, civilized life, of pure love and high virtue ; the half human centaurs represent savage life, with its violence and ignoble passion.

In the middle of the group stands Peirithoos, the bridegroom king of the Lapithæ. On both sides are centaurs striving to carry off women (including the bride) and boys, and opposed by heroic

Lapithæ, assisted by Theseus, king of Athens. At each extremity are two recumbent wood-nymphs, looking on as calmly as if the matter were one of every-day occurrence. This, of course, shows that the fight took place in the woods. It is on the authority of Pausanias that the central figure is named Peirithoos. Most archæologists hold that it represents Apollo, a theory which reduces them to strange straits, as we shall see. We will now pass in review the various figures of the group, and I beg to call special attention to six things: *first*, the want of ideality in the faces; *second*, the management of the hair both in men and in women; *third*, the blockiness of the nude parts of the bodies; *fourth*, the badness of the drapery; *fifth*, the ungracefulness of the positions of many of the figures; and *sixth*, the general want of life. In considering the sculptures, however, we ought never to forget that they were intended to be, and were, brilliantly painted. The background seems to have been blue. The garment of the central figure was quite evidently red. This of course must have added life to the group, however much at variance with our notions of sculpture it may be.

Passing from the pediment groups to the frieze, we are rather surprised to find how good it is. It represented the labors of Herakles. The style indeed is simple, and the technic not of a very high order; but there is a grace of dignity and a truth about the figures that contrasts most favorably with those of the pediment groups. A fragment of one of these reliefs represents a helmeted Athena, and is full of calm, quiet majesty. Her drapery, though simple, is natural, easy and graceful. To which of the twelve labors she belongs is not certain. Another shows a torso of Herakles, and a third a female head from the Cerberus metope. Another represents Atlas returning from the gardens of the Hesperides, bringing back the golden apples to Herakles, who is rather uncomfortable under the weight of the world, in spite of the fellow on which it rests, and the helping hand of the charming Miranda, in whom the hero has found a ready and natural sympathy. In this little group, a contemplative mind might read the whole story of manly human life, charmingly and simply told. And with all its simplicity, the characteristics of the three figures are well brought out. Atlas looks old and hard; Herakles young, strong and patient; the maiden stately, noble, pure and tender. The weight of the world is well shown by the expanded breast and contracted loins of Herakles. It seems almost a piece of

irony in Atlas to offer his apples to a man who cannot spare a hand to take them with.

Leaving the temple by the eastern door, we come upon the Victory of Paionios, mounted upon a three-cornered column, or rather base (for the Greeks never used columns as bases), some 23 feet high. There was considerable dispute, even in Pausanias' time, about the victory which this work commemorated, and indeed, from an artistic point of view, the question is entirely indifferent. An inscription on the base leaves no doubt as to the authorship. It tells us, moreover, that Paionios made the Victory for the Akroterion of the temple. As it makes no mention of the pediment group, it is just possible that Pausanias was mistaken in assigning it to him. The difference in every respect between the Pelops group and the Victory renders it difficult to believe that the two could have been by the same artist.

The Victory indeed is a great work, nobly conceived, and, in spite of a few defects, nobly executed. She was winged, draped in long flowing robes, and bore a wreath in one hand, and in the other a palm branch, the emblems of victory.

She is conceived as spurning one of the summits of many-peaked Olympus, and casting herself forward to float upon the air down to the earth. She faces one of the *sides* of the base, and is altogether beyond its surface produced. In fact, the figure hangs in the air, being attached to the base by the heavy drapery. The head, which has recently been found in an injured condition, was well shaped and bound round with fillets. The wings were large and just unfolded for flight. The sweep of the body, as it throws itself forward, is superb, and the drapery is so arranged as to express in a way almost worthy of Pheidias the action of the limbs. Indeed, as in all good sculpture, its office is not to conceal, but to reveal. There is a little weakness about the fold under the arms, showing that Paionios had not yet acquired a perfect mastery of his subject. Still the Victory of Paionios is a great work, perhaps the greatest before Pheidias.

I have purposely reserved to the last the greatest of all the works found at Olympia, the one which alone would have sufficed to pay for all the trouble incurred by the excavations—the Hermes of Praxiteles. This statue was found in May, 1877, in the very spot where Pausanias had seen it 1,700 years before. He tells us it was the work of Praxiteles, and we have no reason to doubt his word. It is worthy of that greatest of all marble sculptors. The myth

which connects the infant Dionysos with Hermes, unlike those selected by the artist of the first great period of Athenian art, belongs to the inner and mysterious side of Greek religion, that side whose interest for us grows in proportion as our weakness makes us feel our dependence upon the Unknown Infinite. The Peloponnesian war, which had made the Greeks feel this dependence, is what separates the art of Skopas and Praxiteles from that of the men who, having fought and won at Salamis and Platæa, were conscious of their strength.

Of the Esoteric myths of Greek religion, none fell more readily into the forms of philosophy than the mysterious story of the birth of Dionysos. In the days of Praxiteles, Dionysos had become once more what he was originally, the helpless human child, with a divine father and a human mother, a soul revealed in flesh. Hermes and Dionysos, as a group, bodies forth in a concrete artistic way the care which the Divinity, through his agents, shows toward growing, aspiring, suffering humanity. It is unnecessary to relate the long myth of Dionysos, mingled up as it is with numerous oriental elements. The artist has chosen the moment when the messenger of the gods, bearing the infant, has reached the earth. Like a good messenger, he does not sit down ; but, having thrown his mantle in thick folds over the trunk of a tree, he is resting upon it the arm which bears his charge.

Hermes, represented in something over life-size, is a model of youthful male beauty. The weight of his body rests partly upon the right leg and partly upon the left arm. This true Praxitelean attitude allows the body to assume that beautiful curve which not only expresses ease and balance, but allows the muscular structure to display itself with variety, and this is further increased by the position of the arms, the right being free and raised, the left engaged and lowered. Thus, without any strain, every muscle of the body is shown performing its function in the organic whole, a whole obedient to every movement of the governing will. The broad shoulders, the vigorous well-expanded chest, the round muscular arms, the slight and gradual narrowing toward the firm but mobile loins, the light, graceful, strong but not bulky thighs, all show the ideal perfection aimed at by physical culture, of which Hermes was the patron. But, after all, the most wonderful portion of the figure is the head. In trying to describe it, one feels the utter incapacity of language to express the content of true art. Even

imagination will strive in vain to picture one more lovely: young and beardless, with short thick hair gathering naturally into rich crowding locks, it leans a little forward and a little toward the raised right arm, forming, with the full round muscles of the shoulder and the outward curve of the chest, a treasure of outline hardly found in any other figure. What a contrast it forms to the baldness of the Venus of Melos, in which the head leans toward the lowered arm. The neck of the Hermes, which resembles that of the Ludovisi Juno in being almost as broad as the head, gives to the governed and governing parts of the figure a unity which will evidently never fall into discord through tyranny or rebellion. The face is the most personal that ever was cut in marble. One feels impolite in gazing at it too steadily. The forehead, cut clear against the certain curve of the hair, shows the majestic concentrated brow of Zeus softened into one more broad and tender, passing strong and Zeus-like into the straight Grecian nose, whose nostrils are slightly expanded, as if by the warm breath of habitual, deep, but calm emotion. The skin is soft, round and full, with the slightest suggestion of a dimple, while the moist eyes directed dreamily on the distance, and the ripe lips with their loving curve, express the clear divinity and tenderness, untarnished by hard-counseling experience. To it may be applied with absolute truth the noble verse of Tennyson:

> Manhood fused with female grace,
> In such respect a child would twine
> A trustful hand unasked in thine,
> And find its comfort in thy face.

Such capable tenderness neither sculptor nor painter of modern times has ever been able to transfuse even into the face of the Prince of Pity. And I do not doubt that the Hermes, like several other statues of Hermes I could name, owes its preservation to the fact that the Christians allowed it to stand for a statue of the Good Shepherd.

The right arm of the statue is missing, and there is considerable doubt as to what the hand held. Some think the caduceus; others, a bunch of grapes. The left hand, no doubt, held the Dionysiac thyrsus.

The child Dionysos, whose head was recently found, is a curious study. With his lower limbs enveloped in a cloth whose texture is easily distinguished from that of Hermes' cloak, he places one hand

on the shoulder of the beautiful god, and with the other mechanically grasps the thyrsus to support himself by. He is altogether small in comparison with the god, reminding us of the babe in the arms of Holbein's *Madonna*. The face is hardly that of a child; with its broad high brow and clear outlines, it shows all the possibilities that the outward world of sense will yet develop. And that world of sense, how is it expressed? I think by the bunch of grapes in the hand of Hermes. The child leans forward and looks past the face of the god to that which gladdens the sense. Is that not what every son of man does—looks past the face of God, with its infinite and eternal beauty and tenderness, to see what perishable things he holds in his hand; and the god looks away from him too, far away into the dreamy distance, to his eternal reality, not to his passing childish stage. God is very near us in childhood, but we see not his face. It is only when we have eaten ourselves full of the grapes of sense, and found that they pass and satisfy not, that we turn away, and in so doing meet the face of God. Thus, by means eminently simple, did Praxiteles body forth, in forms of surpassing beauty, the career of humanity—not in the bold, abstract, formal way in which I am obliged to tell it, but with a concreteness and a truth that lay hold upon sense, with all the force of reality, and excite to tears, yea, and to "thoughts that do lie too deep for tears."

JAPAN AS IT IS.

SUBSTANCE OF A LECTURE

BY

REV. E. W. SYLE, D.D.

Some thirty years ago, the Empire of Japan was the stronghold of national exclusiveness. This exclusiveness, persisted in since the time of Queen Elizabeth, was discarded by the Japanese chiefly through the action of the United States government.

Three points are interesting, as showing the connection of Japan with America:

First.—The physical configuration of the continents would lead us to suppose that the northern provinces of Japan were originally peopled by the same migration which overspread the northwest of the American continent. The likeness of the *Ainos* inhabitants of Yezo to both the Esquimaux and certain Red Indian tribes of the American continent, lends probability to this supposition. The discovery by Professor Nordenskjöld of a tribe with settlements upon both sides of Behring's Straits, evidences the feasiblity of migrations from the northeast extremity of the Old World to the northwest extremity of the New.

Second.—It was while sailing westward in search of India, China and Japan, that Columbus discovered America.

Third.—The expedition which opened Japan, in 1854, to foreign intercourse, was an American expedition under Commodore Perry.

Soon after, and partly as a consequence of Perry's expedition, commenced the overthrow of the Shogunate in Japan. Foreign treaties had been made with the Shogun's government, but the Mikado's party, though originally anti-foreign, upon coming into power, wisely accepted these treaties. Foreigners are largely employed in the remodeling of the Japanese government. The navy has been under the direction of Englishmen, the army of Frenchmen. Scotchmen principally preside over the engineering department, and Germans over the medical; to English and Americans, in about equal numbers, have been entrusted the general education of the country. A few instructors in certain departments are Chinese, Russians,

French, Germans and Dutch. There is now established a school system throughout the country, rising from the Village Primary, up through the Middle Schools, the Academy, and the Special College, to the University at Tokio. In this last mentioned institution are to be found, under separate Faculties, the Departments of Law, Literature, Physics, Chemistry, Medicine and Biology. To these must be added the Mint at Osaka, dockyards at Nagasaki and Yokoska, a woolen-mill, a paper-mill, a penitentiary, two lines of railroad, an arsenal, a hospital with 300 students in attendance, there being about 1,000 students attached to the University altogether, and a Normal school for girls. It is worthy of notice that Japan has a Minister of Education, a funtionary not to be found in either Washington or London.

Music is held in high honor among the old school Japanese. They named the three principal strings of their *Koto*, a sort of harp-guitar, respectively the *Ruler*, the *Minister*, and the *People*. He who could harmonize these could rule the empire. Again, he who could play pathetically upon this same *Koto* could hold heart-communion with the departed. When it was proposed to teach music in the Department of Education, an effectual objection was found to proceed from the Kio-bu-sho or Department of Religion, who considered the subject too sacred to be entrusted to secular hands.

The Shogun *Iyeyasu* inaugurated that peculiar system of feudalism, one of whose chief features was that the families of his thirty-six chief Daimios should reside continuously in the capital. Their lords and masters, for a part of the year, were allowed to dwell on their provincial estates. Twelve years ago these thirty-six semi-independent nobles voluntarily replaced all their privileges in their sovereign's hand. This remarkable fact is explained by the weakened and effeminate condition to which the above mentioned policy had reduced the Daimio class. Their provinces were practically governed by a host of officials, whose political suggestions the Daimios did little but order to be carried out. Naturally this class of men would not be sorry to see the fall of those who obstructed their own rise to power in the central government. But not all the activity to which the new *régime* has given rise in Japan has sufficed to employ the energies of the influential class whose minds have been stirred by the writings of Mito, the visit of Perry, the Restoration of '68, and the intellectual emancipation introduced by foreign

books, travel and teachers. This energy is now chiefly finding expression through a recently established, but already powerful, Press and numerous Chambers of Commerce. These two institutions give utterance to the voice of the people, which is demanding in clearer and clearer accents representative government, in accordance with the promise of the Mikado made at the Restoration of 1868.

Experimental efforts have been made by successive Assemblies of the Governors; a Great Council has been established; also a Cabinet, with the necessary departments. Delegates chosen by the people would have been admitted to the Governor's assembly, if the provinces would have provided their expenses, which, however, they failed to do. According to the present arrangements, one who pays two dollars annual tax may vote, and a five dollar taxpayer is qualified for election.

A false impression has been made as to the abolition of Budhism; it still flourishes, but its temples have been removed in cases where they have encroached on ground dedicated to the *Shin-to* cult. So, also, the prohibitions of Christianity have been removed from the edict boards, but only on the alleged ground that they had become sufficiently understood by the people.

Examination of criminals and witnesses by torture is professedly abolished; but there is reason to fear that it is still resorted to in exceptional cases.

As to physical geography, Japan furnishes opportunities peculiarly favorable for the observation of earthquakes, typhoons, winds, currents, tides and volcanoes. An Arctic current from Behring's Straits affects the western side of the islands; the *Kuro-Siwa* (a Pacific Gulf Stream) moderates the climate of the eastern side.

Altogether, Japan opens a novel and most interesting field to the explorer in all departments. In history, in art, in natural phenomena, in ethnography, and in many other respects, we find in Japan aspects of fact and of detail which are unique and of an exceptional value. No country better repays the traveler, and in none can he be more certain of a courteous welcome. The Japanese have nothing to learn from us on the score of good manners; while we might learn from them more lessons than could be briefly enumerated.

ARCTIC MEETING AT CHICKERING HALL, OCTOBER 28TH, 1880.

Reception of Lieut. FREDERICK SCHWATKA and his Associates of the FRANKLIN SEARCH PARTY of 1878, 1879 and 1880.

ADDRESSES BY

CHIEF-JUSTICE DALY, LIEUT. FREDERICK SCHWATKA, U. S. ARMY, AND DR. ISAAC I. HAYES.

CHIEF-JUSTICE DALY'S INTRODUCTORY ADDRESS.

This evening has been specially appropriated by the Society to the reception of Lieut. Schwatka, Col. Gilder, and their companions of the Franklin Search Party. Lieut. Schwatka will present to the Society his official report of the result of the expedition, which we shall have the pleasure of hearing to-night. The relics brought back by the expedition, arranged about the platform, are, as you see, quite numerous. They will be described by Col. Gilder in the course of the evening, and will be found very interesting.

Before introducing Lieut. Schwatka, it may be as well to give a brief account of the origin of the expedition, which, though sent out under the auspices of the Society, was, in fact, planned and carried out by Messrs. Morison and Brown, shipping merchants of this city, in coöperation with a few of the Fellows of the Society. In the spring of 1879, Mr. John C. Morison, of the firm of Morison & Brown, who are members of the Society, called my attention to a statement made to him by Thomas F. Barry, then the second mate of the *Ann Houghton*, a whaling vessel, which was stranded in 1876 on the northeastern shore of Hudson's Bay. Barry's statement was, that in 1872 he was with Capt. Potter in a New Bedford whaler that passed the winter of that year in Repulse bay; that a number of Esquimaux built their snow huts close to the vessel, among whom

were two families of the Netchelli tribe of the Esquimaux, from whom Capt. Potter obtained a few spoons and other relics of the Franklin expedition, which he afterwards brought to this city. Barry said that one evening in the cabin of the vessel, whilst the Esquimaux were sitting around, and Barry was making some entries in a journal, he heard one of the Netchelli remark that the book which Barry was writing in was like one which the white men had who had been amongst them, upon which Barry and Capt. Potter, both of whom spoke Esquimaux, inquired respecting the white men, and the two Netchelli told them that many winters previous a party of white men came to where their tribe was then passing the winter, all of whom died of cold and hunger, the winter being very severe; that during that winter there was neither game nor seals, and they had themselves to subsist on the skins of seals and other animals; that one of the white men, whom the Esquimaux called a *leader* or *father*, was a stout man, who wore a coat with three stripes of some kind on the lower part of the sleeve, who gave directions to the others; that the white men died one after the other, those who remained burying those who died, wrapping up the body in a kepick or blanket with which the Esquimaux cover themselves while sleeping, laying it upon a rock near by, and covering it with stones to keep it from the wolves and bears, and that when the spring came all were dead; that after many had died the rest made a ketch (*cairn* or *cache*) and put under it something resembling the book in which Barry was writing. The Esquimaux, as is well known, are familiar with charts and can accurately trace the lines of coasts with which they are acquainted, and being asked to point out the place where the white men died, the two Netchelli, Barry said, followed up the coast line to the Gulf of Boothia and indicated west of Cape Inglefield a spot which they said was an island where they were that winter, and where the white men were buried. Barry's further statement was that in the winter of 1876 he obtained at Repulse bay, from some Netchelli, a silver spoon, with the Franklin crest on it, which he brought to New York, and these Netchelli, he said, confirmed the story he had previously heard, one of whom stated that he had seen the white men, and offered to go with Barry and point out the spot. Barry was brought to me by Mr. Morison, and I had his statement taken down in writing. All who are familiar with Arctic explorations attach but

little weight to accounts given by whalers or other seamen of conversations with the Esquimaux, as they have but an imperfect knowledge of the language of the natives, and there is no assurance that they and the natives fully understood each other. After taking down Barry's statement, therefore, I sent for Capt. Hall's guide, Joseph Eberling, who was then living at New Bedford, who knew Barry and had talked with him; and when Eberling told me that Barry spoke Esquimaux very well and that he had no doubt that he understood the natives with whom he had conversed, I was very much impressed with the fact that Barry, in an interval of four years, should have heard substantially the same statement from different members of the Netchelli tribe, at places widely apart, and that the last Netchelli spoken with had offered to go and point out the place where the cairn had been erected containing the book, and as there was nothing in Barry's manner to lead me to doubt the truth of his statement, I thought it desirable that the spot referred to should be at least visited and examined, as it involved only a journey of 400 miles from Repulse bay, where the whalers generally winter.

Mr. Morison communicated Barry's information to the British Admiralty through the British Minister at Washington, and they referred the matter to Admiral Sir Leopold McClintock, whose letter to the Admiralty was not favorable to their making any investigation. He was of opinion that the Esquimaux were generally truthful, but he had not much confidence in Barry having correctly understood them. He thought the statement was itself intrinsically improbable; that it was the result of putting leading questions to the Esquimaux by a seaman who, as is usually the case with that class, had but a smattering of the language, a means of communication necessarily attended by such confusion and mistakes as to render any apparent information thus obtained of little value; an opinion which was confirmed by the result of Lieut. Schwatka's expedition. He thought, further, that as the spot was sufficiently indicated it would be a comparatively easy matter for the whalers who regularly visit Repulse bay to go there and examine it; that if it was ascertained that any of Franklin's party had visited the spot and any document should be recovered, he suggested that a payment should be made by the Admiralty for anything useful that might be obtained.

Messrs. Morison and Brown then concluded to send out a vessel upon a whaling voyage to Hudson's Bay in command of Capt. Barry,

and to connect with it an exploring party to visit and examine the spot indicated in the Gulf of Boothia. Lieut. Schwatka, an officer of the United States army, who was then at his post in Oregon, having learned through the public journals of the proposed expedition, volunteered to take command of it if leave of absence could be obtained for him from the Secretary of War. Messrs. Morison and Brown accepted the offer; Lieut. Schwatka came to this city; leave of absence was obtained from the Secretary, and Messrs. Morison and Brown fitted out, for the whaling voyage, the *Eöthen*, a small vessel that had previously been employed in making voyages for seals in the Antarctic. In connection with this whaling voyage, and under the auspices of the society, the expedition for the exploration of the Gulf of Boothia was organized, consisting of Lieut. Schwatka; Col. W. H. Gilder, as the special correspondent of the New York *Herald;* Joseph Eberling, before referred to, who is more familiarly known to us as Esquimaux Joe; and Messrs. Henry W. Klutschak and Frank F. Melms, seamen, all of whom volunteered their service, the principal part of the expense of the outfit of which was borne by six Fellows of the Society. Mr. James Gordon Bennett supplied a full and serviceable set of astronomical instruments; Mr. Lorillard made a contribution to the stores; additional stores were supplied by several merchants of the city; and Messrs. Brevoort, Herrman, Bernheimer and myself made up a sum of money to pay the main part of the cost of the outfit. I doubt if any expedition successfully carried out was ever despatched to the Arctic with so small an expenditure.

Upon arriving at Repulse Bay, Lieut. Schwatka found that the principal Netchelli with whom Barry had conversed had in the meanwhile died, and that the other, named Ik-ke-sik, who had left the Netchelli country when quite young, knew of the Franklin expedition only by hearsay. He found, however, another Netchelli who gave him much information corroborative of that which Dr. Rae and Capt. Hall had obtained of the loss of the vessel and the death of the survivors in the vicinity of King William's Land. In addition to this information, he conversed with a Netchelli named Nu-tok-ee-ak, whom he found very accurate in his geographical knowledge, who was familiar with the southern coast of King William's Land, where the Franklin party were last seen, along which, from his account, were many more skeletons than Sir

Leopold McClintock or Capt. Hall saw or heard of. This Netchilli informed Lieut. Schwatka that none of the white men had ever passed through the Netchilli country southeast of King William's Land or the adjacent mainland, which they would have to do to reach Repulse bay or any part of the Gulf of Boothia; that neither he nor any of the other natives had ever heard of a cairn in that vicinity; and he stated what was very conclusive, that the Netchilli never visit that country. Lieut. Schwatka also ascertained that the deceased Netchilli with whom Barry claimed to have conversed was an aged paralytic, who had an impediment in his speech that made it exceedingly difficult even for the natives to understand him, and this, together with some information as to the manner in which Barry became possessed of the silver spoon before referred to, convinced him that there was no foundation whatever for the statement that Barry had brought it back, and that a journey to the Gulf of Boothia for the discovery of the island and supposed cairn would be a useless undertaking. The intelligence he had collected, however, satisfied him that further information could be obtained than had been procured by Dr. Rae, Sir Leopold McClintock or Capt. Hall, by a journey to King William's Land and the opposite mainland, a journey embracing about two hundred miles that had never been touched by any explorer. This journey he undertook in the spring of 1879 and successfully carried out, the results of which are embodied in the report now made by him to the Society, and a detailed account of which has been given to the public in the admirable letters published by Col. Gilder in the New York *Herald.*

I regret to state that the whaling voyage in the *Eöthen* under Captain Barry was unsuccessful, resulting in a heavy loss to Messrs. Morison and Brown, and to those who assisted them in the adventure. It is to these gentleman, and especially to Mr. Morison, that the credit is due of orginating the expedition. That it was sent out at all was chiefly owing to the persevering exertions of Mr. Morison, and it is a matter of sincere regret that the whaling adventure with which it was connected proved so disastrous as to lead to the failure of the firm of Morison and Brown. Mr. Morison has now left this city for other parts of the United States, and it is but just that he should receive at least this tribute from my hands for originating an expedition the carrying out of which has reflected

so much credit upon Lieut. Schwatka and his associates, but has brought upon him and Mr. Brown only pecuniary loss.

As I was one of the promoters of the expedition, I prefer, instead of expressing my own opinion of its results, to read what has been said of it in a recent editorial in the London *Times.*

The London *Times* of the 17th of October last devoted a long editorial article to Lieut. Schwatka's expedition, some portions of which I will read, as showing what opinion is entertained in other countries respecting it. The writer says: "The common type of Arctic journeys presupposes permanent quarters in ships, specially constructed and equipped to reproduce as much as may be the comforts of civilized life and a temperate climate at the frigid north. Dr. Kane and other Arctic voyagers have told how possible it is, when the ship is arranged for the night, to look round the warm cabin and forget the surrounding waste of savage desolation. But in a land expedition, such as Lieut. Schwatka commanded, where the dangers are as many, the tribulations of daily existence are multiplied a hundredfold. The records of Franklin's land expeditions sixty-one and fifty-five years ago, and of Back's eight years later, demonstrate what these are.

"But experiences like those of Lieut. Schwatka's expedition, in a sledge journey of eleven months, it would be difficult to match, even in the painful reminiscences of Arctic labors. Always conscious of an enemy on the watch about their path, they must, at intervals, have felt his sword at their very hearts. None who have not braved an Arctic winter can rightly understand the mere meaning of a temperature 100° below the freezing point. How human frames endured such an ordeal, it is hard to imagine. Only the human sense of power to bear what others have borne and the instinct of an obligation to let no scattered clew of hapless, generous, endeavor perish unrecorded, could have sustained this little company of dauntless sailors amid the warning evidences of polar remorselessness. * * *

"The veteran Arctic explorers express a natural regret that the success which Lieut. Schwatka has won should not have been achieved by their own countrymen; but Englishmen may rejoice that in the long and glorious chronicle of these expeditions their kinsmen from the great American Republic share no unequal space with themselves. The munificence of citizens of the United States

went hand in hand with the affection of Lady Franklin and the conscience of the British nation in the resolve to bring succor or to build a tomb. If it was given to McClintock to disperse the clouds which enveloped the fate of the vessels and their crews, Kane, in the *Advance*, had helped to penetrate the darkness. Lieut. Schwatka has now resolved the last doubts which could have been felt. He has traced the one untraced ship to its grave beneath the ocean and cleared the reputation of a harmless people from an undeserved reproach. * * * He has brought home for reverenced sepulture in a kindlier soil the one body which bore transport. Over the rest he has set up monuments to emphasize the undying memory of their exploits. He has gathered tokens by which friends and relatives may identify their dead and revisit in imagination the spots in which their ashes lie. Lastly, he has carried home with him material evidence to complete the annals of Arctic exploration. Sir Leopold McClintock found that the brave men who perished on their terrible retreat before the legions of cold and disease towards Back's river, had, before they acknowledged defeat, done their work. The Franklin Search Expedition adds the concluding link to the chain."

As Sir Leopold McClintock, who has been for many years an honorary member of our Society, and with whose labor and discoveries you are familiar in the search expedition of the *Fox* in 1857–9, is at Halifax, in command of her Britannic Majesty's squadron, on the coast of North America, I invited him to be present at the reception of Lieutenant Schwatka this evening, which he has been unable to do, as he is about to depart with his vessel from Halifax. I will read to you his reply to the invitation:

Admiral Sir Leopold McClintock's Letter.

ADMIRALTY HOUSE, HALIFAX,
October 20th, 1880.

CHIEF JUSTICE CHARLES P. DALY,
President of the American Geographical Society.

DEAR SIR: I hasten to acknowledge the receipt of your letter of 16th October, inviting me to a meeting of the New York Geographical Society, on the 28th instant.

I regret exceedingly that, owing to the pressure of responsible

public duties, I must deny myself the gratification of being present on that occasion, especially as it would have afforded me an opportunity of returning my thanks in person to you and your fellow members for the compliment conferred upon me some years ago in electing me an honorary member of your society. An additional reason why I would desire to be present, were it possible, at the coming meeting, is that I probably could, through your courtesy, then be permitted to express my views on a few points connected with the Franklin expedition which have not been rightly apprehended by the general public.

1. I am firmly convinced that Franklin's ships were not hastily abandoned, nor until such a desperate alternative became imperatively necessary. The expedition, be it remembered, had sailed with three years' provisions on board, which three years had expired at the date of the retreat from the ships. Moreover, we have too good reasons for believing that a large portion of his stores of preserved meat proved unfit for use; consequently, the abandonment of the ships seems to have been deferred to the latest possible moment.

2. Again, it need not be regarded with surprise that those who landed from the ships perished of starvation, comparatively near to a land which Schwatka's party found fairly supplied with game, for all experience shows that at the particular season of the year when the debilitated crews reached the northwest coast of King William's Land it is absolutely devoid of game; and seeing that twenty-four of their number had already succumbed, it is only reasonable to believe that they were far gone in scurvy and many of them reduced to a condition of absolute helplessness. The "Hospital Tent," at so short a distance from their starting point, affords conclusive evidence of this. In fact, the change from a warm confined lower deck and total inaction, to Arctic tent life, with its accompanying exposure and severe work, rapidly matures the seeds of scurvy. It was so with my late companion in the *Fox*, Lieutenant Hobson, who started on his sledge journey in apparent health, but became in a short time unable to walk, and had to be borne back to the ship on his sledge. Similar instances occurred during the spring sledging from Nares' recent Arctic expedition, even proving fatal in some cases.

3. I am glad to be able to affirm that no rumors whatever of a kind repugnant to our human nature ever reached me from

the natives I met on King William's Land and the adjacent shores; and it has caused me much pain to notice the prominence given in some periodicals to what is at best a mere suspicion, and cannot be either proved or disproved. It is highly probable some frost-bitten limbs were amputated; that natives subsequently found the evidence of this fact; that, being ignorant of the true explanation, and not having themselves any extreme antipathy to the idea of eating human flesh, they would, upon such slender grounds, assume as a matter of fact that which we would feel bound to reject, in the absence of direct irrefragable proof.

4. It may be in your recollection that I discredited the reports of white men having lived, died, and buried their records at an Esquimaux encampment, which reports were, I believe, the principal cause of the recent expedition having been sent out. One of the valuable results of Lieutenant Schwatka's explorations is to prove how unfounded were all such tales.

I believe Lieutenant Schwatka's success to have been as complete as it was possible to be; and we have, I think, reason to congratulate ourselves upon the number and variety of interesting relics which he succeeded in rescuing and bringing home. It affords me personally very great satisfaction to find that the results of my researches in the same region, and the opinions based thereon, have been so fully tested and borne out by his laborious and careful explorations. In conclusion, I beg to thank you for your warm invitation, and still more for the flattering reception which you promised would await me at the hands of the members of the society, as well as of their distinguished president; but much as I would esteem such honor, I am reluctantly obliged to forego it.

With much respect, I beg to remain,

Mr. President,

Sincerely yours,

F. L. McClintock.

P. S.—I hope that Lieutenant Schwatka duly received a long letter I wrote to him on the 2d October, in reply to a telegram; in which letter I endeavored to express my high appreciation of his arduous and persevering explorations.

ADDRESS OF LIEUTENANT FREDERICK SCHWATKA.

Mr. President, Ladies and Gentlemen—Before I turn to the humble efforts of the Franklin Search Party of 1878–79–80, which I had the honor to command, I propose to give a short description of the history of the "Northwest Passage" in the discovery of which Sir John Franklin met his terrible and mysterious fate.

The story of the northwest passage is a link in the great history of oriental commerce, a history which is almost as coextensive as that of civilization. Columbus died believing that he had found the outlying provinces of the coveted Cathay and India, but his discoveries swelled into a vast continent, whose mighty wings, reaching across five zones, barred the further progress of avaricious commerce from the yet distant East. Spain, seemingly disregarding the mighty kingdom that Columbus had placed in her hands, sent Magellan southward in 1519 to round this vast tract of land, and England, her young rival, commissioned John Cabot to find a new and independent route to the northward of Columbus continent, both of them to reach the wealthy Indies, which were then becoming an infatuation with all maritime powers. Magellan discovered the southwest passage to the Indies through the strait which perpetuates his name, and immortalized himself by circumnavigating the globe, which none but the most learned believed until that time to be round. With the voyage of John Cabot, in 1498, begins the history of the northwest passage, a mighty scheme which England prosecuted with all the well-known vigor of the Anglo-Saxon, that she might compete successfully with her Iberian rivals, who, despite the naval victories of Drake, Cavendish, and Burroughs over them, tenaciously held the southern water-ways by a sort of right of more fortunate geographical position. Years after, when England had become the dictator of the deep, the newly-developed commerce with China revived the necessity of that passage from the peculiar positions of the two countries, and the no less potent reasons that she saw her natural channels to India, now her own province, threatened by the invasion of Napoleon into Egypt in 1798, the menacing conquests of autocratic Russia, and the many other political complications which were constantly agitating the belligerent powers of little Europe, and which do not seem even yet to be settled. Such were the mighty motive powers, coupled with a

love of mysterious adventure and a sincere desire for the extension of science, that had enabled Britain to prosecute this long series of Arctic explorations, which, commencing with Cabot, culminated in the terrible and mysterious fate of the final discoverers and the heroic efforts to succor them, which prove the worthlessness of this thoroughfare, guarded by a chilly castle, with its countless bastions of bristling bergs and ceaseless curtains of eternal ice.

The meagre information of the last seen of the *Erebus* and *Terror* it is unnecessary for me to rehearse to a geographical society, and I will at once pass to a very brief description of the search parties that preceded mine to determine their sad fate. As early as the first year after the departure of the *Erebus* and *Terror* from England, apprehension for their safety was experienced in that country. Sir John Ross, a veteran explorer in these regions, in a letter to the Admiralty, advanced the probability of Sir John Franklin being frozen in on Melville Island, unable to proceed in either direction, Sir John Ross's idea being that the expedition would either succeed the first season or be a failure, as to remain a single winter in the ice would be fatal to success. The Lords Commissioners of the Admiralty, however, did not deem Ross's suggestions of sufficient weight to base thereon an immediate relief party, as Franklin was known to be fitted out for three years, and, even if not successful in the object of the expedition, he would more than probably be able to retrace his course, as previous expeditions in these parts had done. In these ideas they were unfortunately supported by officers who had seen more or less of Arctic service. They determined nevertheless to make preparations for a search party to start in the spring of the next year—1847—should no intelligence of Franklin be obtained by that time. Accordingly, in June of that year four small boats, amply fitted and provisioned for one year, were put on board the Hudson Bay Company's ships and sailed for Hudson's Bay, which would be a base of supply, using the company's posts for that purpose. These four little craft were the commencement of that series of search parties which has no equal in the annals of history, extending over a period of a third of a century.

Prominent in the chronological summary of the Franklin search parties are the names of Sir James Clark Ross, R.N., who sailed from England in 1848 in two ships, the *Enterprise* and *Investigator*. Captain Thomas Moore, in the *Plover*, and Captain Kellett, R.N.,

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in the *Herald*, also sailed in this year. Robert Sheddon, in his private yacht the *Nancy Dawson*, cruised for two years about Behring's Strait eagerly searching for tidings of the lost explorers. Sir John Richardson, Captain William Penny of the *Advice*, Captains Collinson, R.N., in the *Enterprise*, McClure, R.N., in the *Investigator*, Horatio Austin, R.N., in the *Resolute*, Ommaney, R.N., in the *Assistance*, Lieut. Osborn, R.N., Lieut. Bertie Cator, R.N., Captain Wm. Penny (2d voyage) in the *Lady Franklin*, Captain Stewart in the *Sophia*, Sir John Ross, R.N., in the *Felix*, Lieuts. De Haven and Griffin, U.S.N., of the first Grinnell expedition, Captain Kennedy, R.N., in the *Alert*, the unfortunate expedition of Sir Edward Belcher, R.N., in 1852, in which he was forced to abandon his two fine ships with their tenders, namely, the *Assistance*, *Pioneer*, *Resolute* and *Intrepid;* Dr. John Rae, Captain Leopold McClintock, R. N. (now Admiral), in the *Fox*, Dr. Elisha Kent Kane, U.S.N., in the *Advance*, Charles Francis Hall in the whalers *Rescue* and *Monticello*, Captain Allan Young in the *Pandora*, and Captain Anderson of the Hudson Bay Company. The story of each successive expedition was almost a repetition of the accidents and misfortunes of its predecessor.

We will now pass to our own, the latest of this long series of expeditions.

On the morning of April 1st, 1879, we dragged our sledges on the salt water ice near Camp Daly, and shaking hands bid our trusty Inniut friends good-bye, and stopped a moment to take a last look at the dreary, cheerless mass of snow-domes that had been our home for eight long months. There is something peculiarly depressing in starting upon a long unknown venture, especially if a person has upon his mind all the cares and duties of a commander, to warn him that in case of misfortune (which *he* must avert) he alone does not suffer. And this was an expedition wherein misfortune might easily befall us. With less than one month's provisions, we were separating ourselves by an icy desert of 800 or 900 miles from all chances of rescue, with 18 human and 44 brute mouths to be fed in a country reported destitute of game, and where that report had received the terrible confirmation of the starvation of over a hundred men led by Sir John Franklin and other as experienced leaders as it was possible to produce in a country famous for its Arctic heroes, there to spend

possibly a year, and under the most favorable circumstances not less than nine months, to make a wide, extended, laborious and thorough search to determine the sad fate of those that had thus died, imposed a duty that might well bring up the most solemn thoughts to one who cared for the lives and comfort of those who thus willingly placed their labors, and if need be their lives, at his disposal to accomplish the great end.

My party consisted of four white men, Colonel W. H. Gilder, second officer, Henry Klutschak, Frank Melms and myself; four Esquimaux families, consisting of 13 persons, among which were four men, Eberling (interpreter), Toolooah, Ishoowark and Ikquesik, and three nearly grown boys, all dog-drivers, hunters, etc. We had three sleds, carrying about 1,000 pounds each, and 44 dogs. The sleds carried about one month's provisions for the party and two weeks' food for the dogs. Dependent largely for supplies upon the game of the country, my armament looks somewhat formidable for an Arctic party, consisting of ten American breech-loaders of different patterns, and over 10,000 rounds of ammunition.

The route was to be directly across land, in a northwest direction, to the nearest available point on Back's river, thence to King William's Land. Crossing the course of the Wager river, as charted in longitude 91° 30′, nothing was seen to indicate this stream, which, from this point, is traced some 45 miles further to the westward on the Admiralty charts. This, coupled with the fact that the Quoich river, when corrected for its erroneous longitude of nearly two degrees as now charted, would intersect the Wager river near its head, makes me safe in asserting that the latter stream must fall far short of the extended dimensions given it upon the maps. Although at times very hilly and even mountainous, the country traversed was sufficiently available for sledge travelling to allow us to make from ten to fifteen miles per day. Our greatest obstacle was the well-known tempestuous weather of the Arctic. We had an almost uninterrupted storm from the 20th of April to the 1st of June, forty-three days. When in latitude 66° 47′, longitude 93° 04′, the country very mountainous, we came upon a river near its head which proved to be a tributary of Back's river, emptying into the latter on the western side of Cockburn bay. We travelled along this stream, which I named after his

Excellency the President, something over a hundred miles, and two days before leaving it, and about forty miles from its mouth, we came upon a small village of Ooqueesik-Salik, or Ookjoolik Esquimaux, of about thirty souls, only two of whom had ever before seen any white man. One of these, Ik-kin'-ni-lik Puh-too'-roke, a very intelligent looking man, aged about 55 or 60 years, gave us much interesting information of a lost *kodloonah* (white man's) ship that he had personally visited some thirty years before, eight miles due west of Grant Point. This is evidently the same ship variously described and located by previous searchers from hearsay evidence of other natives, and was one of Sir John Franklin's ships that floated down Victoria channel after its abandonment off Victory Point on King William's Land. Ik-kin'-ni-lik Puh-too'-roke's story is briefly as follows: He remembers Lieutenant Back on his exploration of the Great Fish river in 1834, and recounted minutely his meeting with that explorer at the Dangerous Rapids. He says that the next white man that he saw was a dead one, in a large ship eight miles off Grant Point, some thirty years ago. The body was in a bunk, in the after part of the ship. This ship, as he describes it, had four big sticks, one pointing out and the other three standing up. There was one small boat hanging from the davits, which they cut down. Some three or four of the ship's sails were set. The natives found many empty casks on board, and numerous quantities of other articles that he enumerated, among which were four red tin cans filled with meat, besides many that had been opened. This meat was full of fat. He saw a large pile of dirt on one side of the cabin door *on the snow*, showing that some white men had recently swept out the cabin. On the main land, near Grant and Smith Points, he saw the tracks of white men, and judged they were hunting for deer. The first time he saw the tracks of four and afterward the tracks of three men. He saw the ship in the spring, before the spring snow falls, and the tracks in the fresh spring snows of the same year about the time the young reindeer come (June). He never saw the white men, but thinks that they lived in the ship until fall and then moved on the mainland. The natives did not understand how to enter the vessel, so they cut through one side, and when the ice melted in the summer she sank as the water poured in. After sinking her masts stuck out of the water and

they collected many things which floated ashore. Shortly after the ship sank they found another small boat in Wilmot bay. No monuments erected by the white men were ever found.

Among the many relics which I have of Sir John Franklin's expedition is a small board, from its appearance probably a bunk-board, which once formed a permanent part of this ship, and was stripped therefrom by the Ookjoolik natives. On one side are formed the initials, L. F., by the heads of old style copper tacks. It is to be hoped that from this relic and data in possession of the British Admiralty that the ship that sank off Grant Point may be identified. I might here add that subsequent testimony of other natives corroborated this story closely, especially in regard to locality.

On the 31st of May we encountered a large village of Netchilluk Esquimaux in the bay, just west of Richardson Point, containing about 100 persons, by the time we had left it, two days afterwards. From them we had obtained some very important information which, coupled with other testimony obtained elsewhere, shows beyond all reasonable doubt the complete destruction of the more important records of Sir John Franklin's expedition at a point (which I called Starvation Cove) three miles northwest from this village. This spot was then visited (June 1st) and, being completely entombed in the snow, was marked for a summer's search, which it afterwards received by a portion of my party, and although no traces of the records were found, owing, no doubt, to their perishable nature, yet sufficient evidence was shown to confirm the natives' accounts in all other important particulars. At Starvation Cove the Netchilluks found a small boat, on its keel, and in it some skeletons, while outside were a few scattered around. This is, I think, the small boat spoken of by Rae, McClintock and Hall, all of whom place the number of the dead at from forty to fifty. All of the natives I interviewed, and who had been eye-witnesses to the sad scene, closely corroborate each other—although interviewed at different villages some distance from each other—and place the number at from six to ten. The most important information connected with this boat-place, which is evidently the farthest reached by any body of Franklin's men in 1848, is that concerning *a* SEALED *tin box*, about two feet long and about one foot square on the ends, which was *broken open* by the natives *and found to contain books* and a small piece of iron, to

which all pieces of the same material would adhere when brought in contact. This tin box was retained by the Netchilluks and its contents emptied upon the ground, where they slowly perished. Some few of them were given to their children for playthings. In this boat was also a small box containing human bones that had been sawn in two in order to extract the marrow, thus showing that they had been reduced to the most distressing and terrible condition in order to prolong life. That men thus placed should have burdened themselves with such a quantity of books, and the careful manner of their preservation, shows an importance which can only be attributed to the records of the expedition. I think it not improbable that the magnetized iron spoken of by these people, from its description, was the dip-needle with which the north magnetic pole had been redetermined, their beset condition in its vicinity giving them unusual opportunities to narrow this interesting problem within closer limits than could have been done by Ross, its discoverer, in his hasty sledge journey in 1831. This instrument would be a valuable historical relic.

The party remained on King William's Land from June 10th to November 8th, engaged in a thorough search of that island and its adjacent mainland. It may be interesting to note that the civilized food of the party was exhausted June 24th, previous to which time it had been greatly reduced, especially in the more favored game localities. After this date and until March 20th, 1880, the white men subsisted the same as their native allies, principally upon the flesh of the reindeer, 511 of which were killed by the party on the expedition. The snow had sufficiently disappeared by the 4th day of July to commence the search, and at this date we were at Cape Felix, King William's Land, near which the *Erebus* and *Terror* had been beset in September, 1846. From Cape Felix to Collinson Inlet, only from 15 to 25 miles of coast line, we were engaged in searching from June 27th to July 14th, traversing 278 miles, the search being thorough and extending a number of miles inland. This strip of coast was important, as being the nearest land to the imprisoned ships during the two years previous to their abandonment. Two cairns were here found, but their despoliation revealed nothing of importance. Under the base stones of one was a sheet of letter paper containing a drawing of a hand, the index finger extended, which pointed, as it was found, in a southerly direction.

It was much decayed, and may have contained some written instructions underneath the hand, that portion having rotted away. The number of relics here found was large and interesting. In a grave between Victory Point and Cape Jane Franklin was found a silver medal awarded by the Royal Naval College to John Irving in midsummer of 1830, as second mathematical prize. This, with corroborative evidence, showed the grave to be that of Lieutenant Irving, the third ranking Lieutenant of H. M. S. *Terror*, Sir John Franklin's second ship. This grave, like all others found, had been built upon the top of the ground, and had evidently been desecrated by the natives in the past, but few of the bones remaining, and these scattered over a wide extent. The grave showed that the body had been interred in coarsely-stitched canvas. From this I infer it probable that Lieutenant Irving was not buried from the ships beset 15 miles N. N. W. from this point, for, considering their contemplated abandonment, his body would certainly have been given a coffin had he so been situated. The inference, therefore, is that he belonged to a party returning to the abandoned ships. This inference is also strengthened by the Ookjoolik testimony previously given, and also the fact that of the nine officers (Sir John Franklin and Commander Gore and others) and 15 men known to have died previous to the abandonment in April, 1848, as shown by the McClintock record found at this point, no traces whatever could be seen of their graves along this limited coast line, although it would have been impossible to have constructed them with any kind of care and have escaped detection. The only inference is that the hummocky state of the ice between the ships and the shore, and probably the scorbutic condition of the crews, forbade the transportation of their dead to the latter point for interment, and they received sailors' funerals in the waters of Victoria channel. In this bay, which I called Irving bay, was also found the record left by Captain McClintock, and although nearly a quarter of a century had elapsed since its deposition and its consequent exposure (as it was found upon the top of the ground), it was still in a fair state of preservation. Some stockings were also found, coarsely constructed from blankets, showing a reduced condition of necessary clothing. Many other interesting relics found here I have not space to enumerate.

Returning southward, a skeleton (partial) was found and interred near Franklin point, and another, which, from the fine quality of

clothing, linen, buttons, etc., I infer to be an officer, was reinterred in a desecrated grave on Point Le Vesconte. A skull was found about five hundred yards from a despoiled grave on Payer point, in the latter there being found only a belt-buckle and a musket cap. In South Erebus bay the boat place described by McClintock in 1859 was encountered. Here some four or more skeletons were properly buried and a few interesting relics gathered. The evidence at this point seems to indicate that this boat and the sledge on which it rested had floated here from the sea, and it must, therefore, have been abandoned on the ice, probably at the time Victoria channel broke up in the summer of 1848. Near here the ice broke up with us July 24th, rendering further sledging impracticable, and we were occupied until August 6th in crossing our effects from Erebus to Terror bay, a very slow and laborious undertaking. A most thorough search over the shores of the latter bay failed to disclose the tent-place previously described by Hall, and of which I had also heard during my inquiries among the Netchilluk Esquimaux. Rejoining this band later, they gave me the additional information that all traces of this tent-place and its many skeletons had been destroyed by the encroachments of the sea some six years before, when they had visited it. An incomplete skeleton was found and reburied near Hornby Island on Graham Gore peninsula.

No traces, except a few unimportant relics, as broken oar-blades, etc., were found until Tulloch point was reached, where a single incomplete skeleton—seventeen bones—was pointed out to us by the natives. After reburial, as had been done at all such places, a rock monument was erected to designate the spot. A painfully interesting circumstance is shown in the rough construction of this grave from small stones, although larger and better adapted ones were in the immediate vicinity, differing in a marked degree from all previous graves encountered, thus showing the rapidly waning strength of the few survivors.

The next point is just east of Pfeffer river, already visited by Hall in 1869, and where there still exists a cenotaph erected by him in May of that year near two of Franklin's men. These graves had been desecrated by the natives in quest of booty, both previous and subsequent to Hall's visit.

The next spot searched by a portion of the party was the boat-place in Starvation Cove. Here, as already stated, sufficient evi-

dence, relics, etc., were found to corroborate the Esquimaux statements in nearly all important bearings, leaving, I think, no reasonable doubt but that their story of the loss of the records here must unfortunately be too true. Parts of some four or more skeletons here received burial, and one other, about four miles due south, on the head of a little inlet, which was evidently that of a sailor from his dress, was also decently interred.

My party remained on King William's Land until November 8th, waiting about three weeks for Simpson's Strait to freeze over, when the homeward sledge journey was commenced. The expedition was divided into two parties, two sledges going direct by Back's river to the Dangerous Rapids, while I took one and made a detour towards that point, in order to survey a large inlet frequently spoken of by the Esquimaux, which was not mapped. I found it to be over fifty geographical miles in depth, very narrow at its mouth, where it connects with Wilmot bay, and swelling to probably twenty miles at its widest part. I named it after the general of the United States army. Sledging from the head of Sherman's Inlet to Back's river, we should have crossed the Chantry mountains, but nothing was seen to distinguish these, as mapped, from the general slightly hilly character of this section of the country. My tracing of a portion of Back's river also differs very materially from the Admiralty charts.

The return winter journey I had hoped would occupy but little over a month, but a combination of unexpected circumstances delayed my reaching Camp Daly until March 4th, 1880. The coldest weather encountered was —71° F., January 3d, 1880; the average for that month, which was the coldest, being —53°.2, F. I was pleased to note the perfect acclimatization of the white men of the party, who suffered no more than the Esquimaux under similar circumstances.

Reaching Camp Daly, I was confronted with the unexpected fact that Captain Thomas F. Barry, master of the *Eöthen*, who had been entrusted with all of our remaining provisions and a large quantity of other material, had stolen them in his departure from Hudson's Bay in the summer of 1879. The theft of the former, particularly, placed us in a very perilous condition, as the Esquimaux were in a reduced state for food, owing to continuous protracted storms; and the party, after suffering considerably therefrom, found itself March

20th, at Marble Island, where to the kindness and generosity of Captain M. A. Baker, of the American whaling bark *George and Mary*, of New Bedford, is due their remaining comfort while in North Hudson's Bay and a tender of passage to the United States.

In concluding, I think it may not be uninteresting to make a brief résumé of the most salient points connected with the expedition.

It is the longest sledge journey ever made, both in regard to time and distance, having been absent from its base eleven months and twenty days, and having traversed 2,819 geographical or 3,251 statute miles.

It is the first sledge journey conducted through the heart of an Arctic winter, and one pronounced by the Esquimaux themselves to be exceptionally severe. Not but that a number of sledge journeys have been undertaken by white men in the Polar mid-winter, but I know of none before this encompassing the whole duration of that unfavorable season; and, in fact, they have generally been very short and under circumstances where comfort commensurate with the exposure could be readily obtained from a suitable base.

It experienced the coldest temperature ever recorded by white men in the field, not only for a single observation, —71° F., but also in regard to protracted cold, there being sixteen days whose average shows one hundred degrees below the freezing point, and twenty-seven days when the thermometer stood below —60° F., during all of which weather the party prosecuted its journeys without severe frost-bites, and even in comparative comfort. Dressed in native reindeer clothing, and living in the igloos of the Esquimaux, the matter of temperature becomes, to white men, entirely of secondary importance, and, everything else being favorable, I believe that a protracted sledge journey could be made successful in the lowest recorded temperature.

It is the first Arctic expedition whose sole reliance for the subsistence of itself and draft animals has been premeditately placed in the game of the locality, and whose experience in that respect has been spread continuously over every month of the year, it having started with less than one month's full rations for the consumers, and having been absent for a period already stated.

It was the first expedition wherein the white men of a party lived solely upon the same diet, *voluntarily assumed*, as its native allies. This fact, coupled with those already stated, plainly shows that white

men are not only able to live the same as Esquimaux in the Arctic, and with equal comfort, but also to prosecute any projects that their superior intelligence or ambition may dictate or desire, and under *all* the circumstances that the natives themselves would venture to undertake for less laudable objects.

It is the first considerable overland sledge journey in the Arctic, the unanimous opinion of previous voyagers being more or less pronounced against such travels, an opinion to which they gave practical illustration by oftentimes unnecessary détours to follow salt water ice or sinuous water-courses. The experience of my party over all kinds of country shows that the value of the sledge, properly conducted, has been greatly underrated as a means of land locomotion.

In its searches, that party was the first to make an extended summer's exploration over the ground covered by the unfortunate crews in their endeavors to reach aid, although a glance at the map will show that their base was in a far less favorable position for such an undertaking than that of the great majority of the numerous searchers who preceded them.

It performed the last sad rites for the few remains of the lost crews, owing mainly to the favorable circumstances of a summer's sojourn. From the thoroughness of the search and the conspicuous contrast of the bleaching bones with the brown claystones composing the flat coasts of King William's Land and adjoining mainland, I do not hesitate to state that not a single unburied man of Sir John Franklin's expedition probably exists. Where nature had not anticipated my party, or the retreating crews themselves performed the burial, we completed these sad offices. From the incompleteness of the skeletons, their inextricable confusion, and wildly scattered condition, it is hard to place a close estimate upon the number interred, which, roughly speaking, varies between 17 and 40.

It established the loss of the records of the Franklin party beyond all reasonable doubt. As these alone have been the main incentive to the many expeditions since Dr. Rae's in 1854, who established the loss of the party, this success, although unfortunately of a negative nature, is of no small character, since this loss, coupled with the loss of the party and the burial of their dead, must necessarily settle the Franklin problem in all its important aspects.

To my subordinates, officers and men, white and native, is due the

fact that such an undertaking was made possible, not only by their untiring energy in their several departments, but also to their cordial co-operation and harmonious working as a whole.

REMARKS OF DR. ISAAC I. HAYES.

I find myself here to-night much in the same situation as that of George Canning's needy knife-grinder, who, when accosted by the "Friend of Humanity," and importuned to tell the story of his wrongs, wonderingly exclaimed: "Story? God bless you, I have no story to tell, sir." And so, in like manner, though by no means under circumstances of like importunity, I may say to you, Mr. President, and to this large audience, gathered to meet our friend and guest,—I have no story to tell. But *there* sits a man whe *has* a story to tell, and who has told it as only a brave man would or a brave man could.

Lieutenant Schwatka has explained, with modest, yet fitting pride, that he has, as to length of time and distance and variety of seasons, through which he and his party were exposed, performed a journey unparalleled in the history of Arctic travel. This is eminently so. It was a bold undertaking; for, to use a military phrase, the value of which our gallant friend was trained to understand, he abandoned his base, relying for his supplies upon the hitherto untraversed country through which he was to pass; yet, by persistently following a fixed plan of operations, by never once faltering in the direct purpose of his journey, and, above all, by the proper exercise of a natural gift for command, by which means he held throughout the confidence and ready support of his people, he has won a splendid victory, and added his own to a long list of illustrious names connected with this Arctic search—names which the world will not willingly let die.

The Arctic regions have been peculiarly prolific in instances of endurance under great exposure; and in the search for Sir John Franklin, now so completely ended through the efforts of Lieutenant Schwatka and his brave followers, journeys of almost incredible distance have been performed. Parties have been on the ice two and three months at a time, much of it during the most inclement period of the year, dragging after them sleds laden with the food, tents and bedding, over trackless wastes where no living thing was seen,

nor food of any kind gathered by the way. Conspicuous among the leaders of such parties have been Captain (now Admiral Sir Leopold) McClintock and Dr. John Rae—names more closely identified with the solution of the Franklin mystery than any others until now.

The Russians have made many extended journeys over the frozen sea north of Siberia, and a very considerable part of the northern coast of Asia has been explored in this manner. The new Siberian islands were thus surveyed by Hedenström in 1810, and Lieutenants Wrangell and Anjou (afterwards Admirals of the Imperial Navy), during their four years' residence on the Siberian coast, from 1820 to 1824, added vastly to the geographical knowledge of that quarter, and greatly to the interest of the trade in ivory, which, in immense quantities, is dug from the frozen bogs of the Siberian rivers. These journeys of the Russians differ from those of the English in having been performed with sleds drawn by dogs instead of men. I do not recall, at this moment, the exact time and distance of any of them. If, however, I should be allowed to count myself in the lists, I might mention that I once conducted a party over the ice between twelve and thirteen hundred miles, and yet, during the sixty days of our absence, we carried our provisions with us for the entire journey, had no shelter but a snow hut, experienced a temperature of 70° below zero (102° below freezing); yet so inured had we become to the climate, and so perfectly had we become skilled in guarding against accident, that we returned to our ship in winter quarters without so much as even a snow-blind eye or a frost-bite to tell of suffering and speak for sympathy. But neither this, nor the English and Russian journeys, compare with that of Lieutenant Schwatka, the peculiar feature of which is that it was a continuous march, with but rare and short intervals, through almost an entire year, and extending over more than 3,000 miles; while those to which I have before alluded were limited as to days of absence, on account of the necessity for a close calculation as to the food that could be carried on the sled, there being no game to furnish fresh supplies. Lieutenant Schwatka, on the other hand, journeyed mainly on the land (which, further north, is too rugged to be traveled over), taking his chances of getting food from day to day. Had the deer failed him, he must have perished with all his people; for on such a journey as that, with so many mouths to feed, including

forty odd ravenous Esquimaux dogs, it was found impossible to carry more than a month's supplies. But from first to last the courageous and confident leader of that little band never once lost heart. He has encountered dangers by flood and field without faltering; he has, without murmuring, endured the greatest cold that has ever been encountered on the march. He has matched himself with the savage man, and, by shere intellectual force, beaten the savage on his own ground, not alone in endurance, but in sagacity in tracking the migratory deer, upon which his success and life depended. An unerring instinct guided him to his goal; and, in the pursuit thereof, he has furnished us a conspicuous example of American pluck and energy. By his courage he has done honor to a noble profession, of which courage is a most essential element. He has wrested from the chill North a secret which she has long kept in her icy grip, and he has brought to us the information which the world has so long desired of the missing link in a chain of evidence.

We owe him thanks for his brilliant achievement, and in this we should include Colonel Gilder, Mr. Klutschak and the other members of his command.

I need hardly say, Mr. President, that I have great satisfaction in being given the opportunity to say this much; and now, as a member of the Society, having so often taken, so to speak, the stroke oar in our meetings upon Arctic matters, I am very much inclined to think that, in all fairness, I ought here and now to stop. But you have so flatteringly asked me to point out the relations of the Schwatka journey to those which preceded it, that I must confess, even at the expense of the good-will of this gracious audience, I am not equal to the refusal.

The Franklin expedition was the last of a great number of attempts which have been made, from time to time, to accomplish a passage by the northwest, through the Arctic, to the Pacific ocean, as a commercial route. It seems strange to us now that such a scheme should ever have been even dreamed of; but we must bear in mind that there was then no Panama railroad nor Union Pacific, and that, to avoid the long and tedious voyage around Cape Horn, the tradition passed from generation to generation that the short route by the north was entirely practicable. The idea, first conceived soon after the discovery of America, was never abandoned

until the Franklin disaster convinced the world that it could not be done.

The two ships, *Erebus* and *Terror*,* comprising the Franklin expedition, left England May 26th, 1845, and, after crossing the Atlantic, entered Baffin's bay, and were both seen from a whale ship off the Greenland coast, in latitude 74° 48′, longitude 66° 13′ west, moored to an iceberg, evidently awaiting the opening of the great body of drifting ice which fills the middle of Baffin's bay, and which is known as "the middle ice" or "middle pack." This was on the 26th of July, just two months from the day of leaving England. Beyond this we know little of the career of these ill-fated vessels. What is known I will endeavor briefly to state.

Some time during the summer of 1845 Sir John entered Lancaster sound, and, agreeably to the instructions of the Admiralty, doubtless attempted to push through Melville sound on the track of Parry, who, in 1819, had gone as far west as longitude 110°, and within little more than a hundred miles of the point to which Sir Robert McClure brought his ship, the *Investigator*, from Behring's straits in 1850.

Baffled he must have been in this direction, for we find him entering Wellington channel, which lies in longitude 92° west, and which he ascended to latitude 77°. Baffled he must have been again, for he retraces his steps and winters at Beechey island, near the channel's entrance. Here the first traces of him were discovered by the Eng-

* These two ships had returned the previous year from circumnavigating the globe in the memorable expedition of Sir James Clark Ross. During the voyage they had penetrated in the Antarctic seas to within 12 degrees of the south pole. When put in commission again for an Arctic voyage, it was generally thought that Captain Richard Crozier, who was the able second in command under Ross, would lead the new enterprise. But so long and so persistent had Sir John Franklin been in his desire to accomplish a northwest passage, that, although well advanced in years, he was offered the command, with Crozier as second. To show his eagerness, it is only needful to read his letters penned about that time. "No service," he writes, "is more near my heart than the completion of the survey of the north coast of America and the accomplishment of the northwest passage." And again: "It would be an intolerable disgrace to this country were the flag of any other nation to be borne through the northwest passage before our own." These extracts prove how thoroughly he believed in the existence of a practicable route to the Pacific in that direction.

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lish and American search expeditions of 1850—three lonely graves there held a mournful secret, but no record could be found.

Of his course the following year we are ignorant. But it is evident that Franklin, despairing of a passage through Melville sound, or through any channel to the north of it, resolved to seek the main land of America, with which he was personally familiar, through his two boat journeys along the shore in 1819 and 1824. Indeed, almost the entire coast-line of northern America had been explored by boat expeditions under Hearne, who was the first to make the Arctic ocean in that quarter; by Dease and Simpson, Mackenzie, Dr. Rae, Sir John Richardson, and Sir George Buck, as well as by Franklin himself. That navigable waters existed every summer all along the mainland was, therefore, well known to Sir John, and that it was navigable by ship as well as boat was subsequently proved by Captain (now Admiral) Collinson, who sailed in the *Enterprise* from Behring strait eastward, as near as I now remember, to about 103° west longitude, thus making from the west within barely more than a hundred miles of where Franklin met his hard fortune, as we shall presently see. Whether Franklin went down in this direction by Prince Regent inlet, or by Peel sound, or by the channel discovered by McClintock, and since called by his name, we do not know; but we do know that, on the 12th of September, 1846, the two ships, *Erebus* and *Terror*, were beset in the pack, off King William's Land, in latitude 70° 05′, longitude 98° 23′ west, and that the firm grip of the "thick-ribbed ice" was never loosened from them while the crews remained alive.

And yet they were within 90 miles of the known sea, which, as we have already seen, had been often traversed. To men who had already in two seasons sailed over 500 miles of previously unexplored waters, how confident must they have felt that the following season of 1847 would liberate them, and see their ships pass over this short intervening space of ninety miles.

But this was not to be! The strong hand of the Arctic winter did not relax its hold when the summer came, and the ill-starred, inbeleagured ships again passed under the shadow of the polar night. Meanwhile, on the 11th of June, 1847, the spirit of brave Sir John passed away, and the tender-hearted and well beloved commander was no longer with his people to share their disappointment and their sorrow, when the winter came again and kept them prisoners

still—prisoners, and yet so near the delectable waters they were seeking, which were almost within their sight, and if but once reached, would lead them homeward with the measure of their ambition filled. Alas! how cruel was fate to these eager, longing men; how heavy must have sunk their hearts when the shades of the long darkness for a third time gathered round them! Another summer dawned; but three years had now elapsed since they had left the Thames. For three years only had they been provisioned, and to risk another winter, without chance of fresh supplies, which the hunt evidently failed to yield, they could not do in reason; and, accordingly, the ships were abandoned; their boats, mounted on sleds, were transported to the coast of King William's Land, and along that coast and over low points of land, when practicable, they took up their weary, toilsome march toward Back's Great Fish river, which it was evidently their intention to ascend, in search of succor and safety at the outposts of the Hudson Bay Company. The distance to be traversed before reaching the river's mouth was about 250 miles, but death left not one of all their number to even look upon that water of their hopes. The ships were abandoned April 22, 1848. In the three years' interval since, buoyant and strong, and fired with an honorable ambition, they had parted from loved ones in England, only 105 of the original 129 were left to struggle now for life.

I pass over the long list of expeditions that have been dispatched to seek the missing ships. Their histories are "familiar to your ears as household words." Many ships have been lost, many lives; the wifely devotion and persistent zeal of Lady Franklin gave unstintingly of men and ships and treasure; and you all remember, either through personal experience or through tradition, the outburst of popular enthusiasm with which America received the offer made by one of New York's princely merchants (the late Henry Grinnell) to send two ships to join the British searching squadron of 1850.

It is enough for me here to refer to the efforts of Dr. John Rae, for a long term of years a surgeon in the service of the Hudson Bay Company, who, by reason of his office, together with a love of adventure and a passion for discovery, had probably traveled further than any one had ever done before in British America. This enterprising explorer was first to invent the key that was to unlock the mystery of Franklin's fate. Well trained in every

variety of Arctic travel, and with an instinct sharpened by the following of many a trail on his distant boat, sled and snow-shoe journeys, he was well qualified to predict, as he did predict, what in the end proved to be the truth.

Prevailing at length upon the Hudson Bay Company to fit him out, he sailed in open boats from Fort York in the summer of 1853. Upon reaching the northern shores of Hudson bay, he took up his winter quarters at Repulse bay. I do not now recall the exact locality, but it was near latitude 66° and longitude 85°. His shelter during the winter was a snow hut, and no fire was to be had other than that which barely sufficed to cook their food.

During the spring and summer Rae crossed over the low lands lying between Repulse bay and Back's river. But when that river was reached the ice was so broken that he could not cross it. He fell in, however, with the same native tribes that Lieutenant Schwatka encountered, and from them he obtained a detailed statement of two ships being abandoned in the ice, of the course taken by the party after leaving them, and that upon the mainland on the opposite side of the river, or on Montreal island near it, the last survivors perished from want. Along with this story Dr. Rae brought numerous relics, easily identified by family crests, names, and other designs engraved upon them. These were in the shape of fragments of watches, buttons, forks, knives, spoons, coins, &c. There being no doubt of their identity, and none as to the accuracy of Dr. Rae's statement, the complete loss of the expedition was considered as established; the names of the officers were stricken from the roll of the living, and Dr. Rae received the government award of ten thousand pounds, offered six years previously, for such discoveries as would lead to the solution of the mystery.

But, for all this, Lady Franklin was not satisfied, and, redoubling her efforts once again, she, after much delay, obtained the help of the Admiralty in another attempt. The steamer *Fox* was fitted out; and, under command of the well tried Arctic navigator Capt. McClintock, sailed in the spring of 1857 to reach the locality of Franklin's ships, as indicated by the report of Dr. Rae; not, however, as he had done, but from the opposite direction to that which Rae had taken. He was to come down from the north. This expedition was at first unfortunate, being caught and imprisoned during the first winter in the Melville bay "pack." But during the following

season McClintock, following upon the track of Franklin, reached within striking distance of King William's Land, and during the spring of 1858 he and his associates, Captain Allen Young, Dr. Walker and Lieutenant Hobson, made an extended search of King William's Land and the neighboring coasts. Montreal island, lying in the mouth of Back's river, was reached, but McClintock did not come upon the actual spot, near by, on the mainland where the last survivors of the Franklin party perished, and which Lieutenant Schwatka only has searched, and which he has appropriately named Starvation Cove. But Lieutenant Hobson, of McClintock's command, found a record —the only written evidence that has ever been discovered, or is ever likely to be discovered, to tell the tragic tale of suffering and death.

This record had been deposited in a cairn or pillar of stones, and the paper had been twice written upon. The first told in few words the route of the expedition, as I have before described it, marked the position of the ships in the ice at lat. 70° 03′ N., long. 98° 23′ W., as I have already said, and was dated May 28th, 1847. Ended with all's well; stated that a party consisting of 2 officers and 6 men left the ships on Monday, 24th May, 1847. And was signed "G. M. Gore, Lieut.; Chas. F. Des Vœux, Mate."

A little more than a year later, this paper, containing this hopeful, cheery view of the situation, was taken from its hiding-place, and another hand had written around the margin some words of terrible significance. These tell us what a change had in this interval of a year come over these brave men's dreams. Sir John was dead; the cheerful Commander Gore, who had the previous May written down "All's well," when no doubt leading an exploring or perhaps hunting party, was also dead; and no one knows who besides. Nine officers and 15 men had fallen victims either to the severity of the climate, improper food, or more than likely scurvy, or all combined. The remaining 105 souls made, as we now know, a brave and desperate struggle for their lives. How desperate it was is sadly shown by the story of Lieutenant Schwatka.*

*The following are the two entries upon the paper, which was one of the ordinary Admiralty blanks used to determine the direction and velocity of ocean currents, by inserting the latitude and longitude of the ship, and after hermetically sealing the paper in a bottle, throwing it into the sea, with the hope of its being picked up by some other ship, or cast upon the shore. It

Besides this record, Captain McClintock found many relics of the party—among others, a boat mounted on runners, in which were two skeletons. The abandonment of this boat, into which two poor fellows had crawled to die, furnishes significant evidence of how early in the journey the party were breaking down.

But notwithstanding these efforts of McClintock and his energetic officers, there remained still a considerable gap between the work done by Dr. Rae from the south and McClintock from the north. This gap was in some slight degree filled in by our countryman, Captain Hall, who lived eight years among the Esquimaux; but it has been now completely covered by Lieutenant Schwatka,

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will be observed that, in the first entry, made by Commander Gore, there is an error of date, as it is known that the ship wintered at Beechey island 1845–46, and not 1846–47, the discrepancy being evident even by the date upon the face of the paper itself :

"28th of May, 1847. } H. M. Ships 'EREBUS' and 'TERROR,' wintered in the ice, in lat. 70° 05′ N., long. 98° 23′ W.

"Having wintered in 1846–7 at Beechey island, in latitude 74° 43′ 28″ N., longitude 91° 39′ 15″ W., after having ascended Wellington channel to latitude 77°, and returned by the west side of Cornwallis island.

"Sir John Franklin commanding the expedition.

"All's well.

"Party consisting of 2 officers and 6 men left the ships on Monday 24th May, 1847.

"G. M. GORE, Lieut.
"CHAS. F. DES VŒUX, Mate."

"April 25th, 1848.—H. M. ships 'Terror' and 'Erebus' were deserted on the 22d April, 5 leagues N. N. W. of this, having been beset since 12th September, 1846. The officers and crew, consisting of 105 souls under the command of Captain F. R. M. Crozier, landed here in lat. 69° 37′ 42″ N., long. 98° 41′ W. This paper was found by Lt. Irving, under the cairn supposed to have been built by Sir James Ross, in 1831, where it had been deposited by the late Commander Gore. Sir James Ross' pillar has not, however, been found, and the paper has been transferred to this position, which is that in which Sir J. Ross' pillar was erected. Sir John Franklin died on the 11th June, 1847; and the total loss by deaths in the expedition has been to this date, 9 officers and 15 men.

(Signed)
"F. R. M. CROZIER,
"Captain and Senior Officer,
"and start (on) to-morrow, 26th, for
"Back's Fish River."

(Signed)
"JAMES FITZJAMES,
"Captain H. M. S. *Erebus*."

who is the only traveler that has ever searched that coast in the summer time, when the land was free from snow, and when the human skeletons, which had lain bleaching there for two and thirty years, could be seen.

This portion of Lieutenant Schwatka's narrative is most touching; and we can, through his words, read the story of the wanderers' waning lives. We can even see them on board their ships, after the three years had passed, their provisions nearly exhausted, no fresh food obtained, their common navy rations of salt beef and pork their last resource, with scurvy as a consequence, and this helped on by the depressed influences of the long winter's darkness and their grievous disappointment. In dread fancy I seem to see them now, even as Bulwer saw in poetic dream of horrid suffering the crew of the Arctic ship, which he thus describes in *King Arthur:*

> "Huddled on deck, one half that hardy crew
> Lie shrunk and withered in the biting sky;
> With filmey stare, and lips of livid hue,
> And sapless limbs that stiffened where they lie,
> While the dire pest-scourge of the frozen zone
> Rots through the vein and gnaws the knotted bone."

We see the hardiest of the crews, day by day, and week by week, while the bright sunshine lengthens steadily, making the needful preparations for abandoning the vessels. It is a tedious and soul-killing work. Out of the timbers of the ships they make rude sleds on which to mount their boats. Out of their sails they make tents and bags to hold their scant provisions. Out of such iron material as they have that can be made available, they fashion stoves in which to cook it. Their wardrobe is eked out with blankets and such other materials as will furnish at best but insufficient covering for their wasted bodies, when they set forth to meet the fearful Arctic storms and low temperature. We see them gathering together their guns and ammunition; their personal mementoes of friends at home, of keepsakes, of medals won by valor, of such camp furniture as each one needs for himself, and, above all, the written records of their three years' labor. And when all these are at length stowed within their boats, we can readily imagine them hauling up the British ensigns at the peaks of the *Erebus* and *Terror*, and, leaving them there to float in the chill Arctic winds,

move off slowly and solemnly on what must have seemed to them an almost hopeless march. We see them on the land writing the brief record of their voyage and disasters; we see them a little further on scraping away the snow to make a grave upon the frozen earth—a rude mausoleum of rough stones, in which to bury the remains of the brave and accomplished Lieutenant Irving. We see them still further on in a hospital tent, trying to gain health and strength and courage for the work before them. We see the region round about strewn with graves, which wild beasts soon disturb. We see them still further on, falling by the way, one by one, and the last grave is made of stones so small that the veriest child could lift them; and when, at length, we see them, now few in numbers, on the mainland, beside the river of their hopes, where others before and after them have found game in great abundance, their strength is gone so far that they cannot follow the timid deer nor hold the rifle for the shot; and so, after all the heroic toil, there is nothing left but to lay them down and die together. One, a little more hardy than the others, toils on a few miles further toward home and kindred, but he, too, falls at last.

Humanity owes a debt of gratitude to Lieutenant Schwatka and his companions, who so tenderly gathered up the bleached bones of the dead and gave them such sepulture as they were able.

A few observations here may perhaps make this disastrous journey clearer to you. You will observe that Lieutenant Schwatka has gone over the entire line of march, from where they first touched the land to where the last man died, examining it with marvelous patience, almost foot by foot, through an entire summer, and all the while subsisting his people abundantly with the products of the hunt. But he was there after the reindeer had migrated from the mainland to King William's Land, which they do every year. Franklin's party were too early to meet the wandering herds that flock there in summer to browse upon the rich moss-beds of the low marshy valleys. Of this Franklin's people were naturally ignorant. Could they have delayed their departure from the ships two months longer, they might perhaps have met the deer and found a plenteous harvest of fresh food.

A parallel case to this retreat is, in the beginning, though, through the mercy of an all-wise Providence, not in the ending, found in the expedition of Dr. Kane, who escaped from the brig *Advance* in

Smith sound in 1855. His crew were, to use his own expressive phrase, "thoroughly riddled with the scurvy," and as I was one of his party, I can speak feelingly and knowingly of the saddening influences by which Franklin's people must have been surrounded. For six long weeks the strongest men—and they were very feeble—were busy with hammer and the saw repairing and strengthening the boats and constructing sleds on which to mount them, while the feeblest were busy with sail needle, thread and canvas on the tents and bags and clothing; and when the cavalcade moved off from the abandoned ship, with feeble step, dragging their three boats across the trackless waste of ice, there were few who thought they would ever see their homes again. But the good Lord was kind to us, and supplies of food—of birds, seals, walrus—were gathered day by day, until at length we reached the Danish colony of Upernavik on the Greenland coast, after a toilsome journey of a thousand miles, made partly over the ice and partly through an ice-encumbered sea, exposed to all the vicissitudes of Arctic temperature and storm during eighty-one days.

And now the long agony of suspense as to the fate of these 129 men, who went forth at their country's bidding to do their country honor, is at length over. Lieutenant Schwatka has done all that mortal man can do to reveal the mystery of their fate. Their hopes and fears, their heroic struggles and their sufferings, were seen by the eye of God alone and cannot be known to us. We can only read the affecting history through the results which we have here brought before us by the touching narrative of Lieutenant Schwatka, and by these even more touching relics of the lost wanderers lying here before us on the stage. Had these 129 men fallen in battle in their country's service; had they been cast away at sea; had some great catastrophe of nature or man's negligence blotted out their lives and left their fate without uncertainty, their names would have quickly passed away from the public recollection, and would have been embalmed alone in the memories of their families and friends. But such has been the harrowing suspense attending their career, such the uncertainty of their fate, such the mystery of their struggle, which every one knew must needs be great, that all mankind have been drawn to them in sympathy, and the whole world has become their family and their friends.

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And now, with the ending of their unhappy history, ends the efforts of commerce to find a northwest passage to the Indies, or a practicable passage for her uses in any quarter by the Arctic seas. But science has assumed the vacant seat, and claims the Arctic regions as her own. In one direction or another, she has, from time to time, penetrated into these ice-bound fastnesses. In her interests brave Nordenksjöld has, with heroic fortitude, sailed in the *Vega* from the Atlantic to the Pacific ocean—the first time that such a feat has been performed. Payer and Weyprecht have, in the *Tegethoff*, penetrated to the hitherto unknown Francis Joseph Land, in the interests of science alone; and other expeditions, less famous, though not less willing, have done noble work in the broad waters stretching from Greenland to Nova Zembla. It was in the interest of science that Dr. Kane penetrated Smith's sound rather than in the search for Franklin, though it was thought possible that he might have gone in that direction, and that it was worth while to try the experiment; and it was in the same interest that my own expedition of 1860, the expedition of Captain Hall and that of Sir George Nares, followed in the same direction. And it may be well believed that that divine curiosity which inspires men to seek knowledge in the hidden places of the earth will not die out until the North Pole is reached and the mysterious and awe-inspiring regions round about it are made plain to the minds of men.

Temporarily, as we may believe, the nations that have taken part in Arctic exploration have ceased their activity, but there is one man, and he is an American citizen, who has his eye steadily fixed upon the North Pole, and with a generous liberality and enthusiasm unequalled in the history of personal enterprise for the purpose of discovery, has sent out the *Jeannette* to seek a pathway to the Pole and to make explorations by the way; and for these services no vessel was ever better equipped. Built expressly for Arctic cruising, and having already made three Arctic voyages, her strength and fitness have been abundantly proved. Her present owner had her additionally strengthened and thoroughly overhauled, and when she left San Francisco, in July of last year, she had on board every convenience for health and comfort that experience could suggest, and ample provisions for a three years' cruise.

To an American audience it is scarcely needful for me to mention the name of the public-spirited citizen who has done this princely thing

—who has so munificently and unostentatiously contributed to the cause of science and the progress of human knowledge. It is the same citizen who sent Stanley into the wilds of Africa to find and help, if need be, the dauntless Livingstone; it was the same citizen who, with like liberality, returned Stanley to the same jungled wilderness to cross "The Dark Continent." I need hardly say that I mean James Gordon Bennett, proprietor of the *New York Herald.*

The immediate objective point of this American expedition of Mr. Bennett was Wrangell Land, which lies to the north and west of Behring strait, and beginning at about longitude 178° west, and near latitude 71° north, is known to extend in a northeasterly direction at least to latitude 74° or 75°. The land was named after Admiral Wrangell, who, during his long residence near the mouth of the Kolyma river, made repeated efforts to reach it. But he never even saw it, although, in former years, while the conditions of the atmosphere were favorable, it had been sighted by the natives and, according to tradition, had been even reached by them and found to be inhabited.

Wrangell's progress in that direction was invariably cut off, even in February, by open water, which open water, or Polynia of the Russians, was always found to extend to the north and west of the New Siberian islands, where it was met by Lieutenant Anjou, Wrangell's associate, in exploration. The land has, however, been frequently seen by whalers during favorable open seasons and traced in a northeasterly direction to a considerable distance. But as the whalers never enter the ice intentionally, but keep along its margin, where the whales most abound, these sights of the land are but accidental. The *Jeannette*, on the other hand, went there expressly to enter the ice, should it exist, at a point where it was most open, and push on through the pack until the land was reached. Then it was the intention of Captain De Long to follow as it trended northward, and beyond it he hoped to find such open water as would lead him on to the pole.

Failing in this, he would naturally seek a winter harbor on Wrangell Land, where he could remain till the present summer and try again. This land may possibly be in the far north toward the east, in the direction of the Parry Archipelago, in which case it would of course form a barrier toward the pole, and the *Jeannette*, by following the coast line, might be driven, as Admiral Collinson has sug-

gested, to seek the American coast through the leads formed by the waters of the Mackenzie river. This I should think, however, hardly probable, for if he found the land to trend in that direction, or failing to reach Wrangell Land at all, I think he would naturally seek to double the southern capes of that land, with the hope of finding the open water, which, according to Wrangell's observation, always exists there. Wrangell thought this water to be the border of an open polar sea. Should Captain De Long have accepted this theory, he might reasonably have expected to find in that quarter the most available passage.

These are, however, all conjectures. The *Jeannette* went into an unknown sea to meet whatever fate or fortune might befall. She was quickly beyond the reach of any searching eye, and, in the nature of things, could no more send dispatches home than Stanley could from the heart of Africa. She must necessarily bring her own news, whether of success or failure. She may be expected home at any time, but, from my knowledge of Captain De Long, I think that if he did not succeed he would not turn back until convinced that success was hopeless. Yet, should he not return this fall, it certainly would be well that the government should send a suitably equipped vessel to Wrangell Land next summer, if not to search at least to furnish a place of retreat for the crew of the *Jeannette* in the event of possible disaster. This would only be a proper precautionary measure, for I do not anticipate that the *Jeannette* has been either crushed by the ice or hopelessly beset, since fatal accidents of this sort are of very rare occurrence—more rare, indeed, in proportion to the number of vessels sailing in the Arctic seas, than the wreck of vessels approaching the American coast from foreign ports. Even at the worst, there would be a sure line of retreat to the Siberian coast, where the natives are friendly—as much so, indeed, as the Greenlanders who succored Kane.

Not only are all conjectures respecting the situation and fortunes of the *Jeannette* idle—they are foolish. Captain De Long could not communicate with us even if he would. I was once for more than two years absolutely cut off from all the world, and except a few savages, saw not a living soul but the ship's company, and could not by any possibility send or receive news; and Captain De Long is in the same situation. One does not go into this Arctic ice with the idea of keeping open his communications, any more than

he carries a telegraph wire to tell his friends below of his progress up a mountain. They are content to wait until he comes down and relates his story; and so we must wait for Captain De Long, and in patience, and let the records of the *Jeannette* tell their tale. Doubtless he and his accomplished officers, with their splendid equipment of scientific apparatus and appliances for travel, have already made many valuable explorations and discoveries, whether they have reached the pole or not.

I must say, however, in justice to myself, that in some of my remarks concerning the *Jeannette*, I have indulged more in speculation than is my wont. This I have, however, done more to answer questions so often put to me by members of the Society and others whom I know to be present, rather than to indulge a fancy. As to my belief, I desire emphatically to say that I have seen no reason whatever to change my complete confidence in the triumphant success of the *Jeannette*. My opinion now is as it was in the beginning. True, we have from time to time evil rumors concerning her. We hear that she is beset in the ice; at another time it is a bad season, and she cannot possibly get out; at another she is certainly wrecked and fragments of her float over the Arctic sea. These are but idle tales, invented by unfeeling men—unfeeling, because they are careless of the emotions and anxieties of loved ones at home, who eagerly scan the papers for the slightest news of the absent.

If there are any friends of any members of that expedition within my hearing, I would bid them be of good cheer. I have been told that Mrs. De Long is present. If so, I would say to her in all sincerity, as one having knowledge and experience among the Arctic ice, that I believe her gallant husband to be as safe at this present hour, though not so happy, as if he were seated by her side.

And further, I believe that, knowing as I do the skill, the energy, the fertility of resources, the high intelligence of this accomplished naval officer, Captain De Long, and knowing the high character of the officers under him, I can safely say, I think, that he will return in due time, and when ready, with the glad tidings that he has sailed triumphantly over the open polar sea, and, like our friend Lieutenant Schwatka, accomplished the object of his mission, to his own honor and his country's glory.

LIST *of Stereopticon Views of Locations visited by the Franklin Search Party of* 1878–'79–'80.

1 Camp Daly from Observatory Hill
2 Winter at Camp Daly, night view
3 Winter at Camp Daly, day view
4 Start for King William's Land
5 Southwest Pass
6 Hayes River scene—Stewart's Monument
7 Cape Herschel
8 Tookso-chiork
9 Alanak*
10 Irving Monument, with view of Point Franklin
11 Terror Bay
12 Grant Point, Adelaide Peninsula
13 Transport of the Relics over land from Erebus to Terror Bay, by the Party and their dogs
14 Fall Camp at King William's Land
15 Douglas Bay
16 On Lake Madame Daly (*December, noon*)
17 Starvation Cove (November, 1879)
18 A November Noon on the Estuary of Backs River
19 Whirlpool Rapids, and McKay's Peak (Backs River scene)
20 Meeting with the Ookosiksillik Esquimoux on Hayes River, May 1879
21 Cape Crozier*
22 Boat-place on Erebus Bay*
23 Dangerous Rapids (Backs River scene)
24 Down Hill (Marching scene)
25 Point Le Visconte
26 Oppen Rapids at Backs River, December, 1879
27 Big Bend on Hayes River*
28 Grave of Lieut. John Irving, with a view of Irving Bay and Victory Point
29 Captain Hall's Cairn, erected May, 1869, east of Pfeffer River
30 The "Last of the Missing"
31 Cape Felix (July 4, 1879)
32 At Resolution Island
33 Whalemen's Cemetery at Marble Island

The views are taken from the Party's Sketch-book, drawn by H. W. Klutschak, with the exception of such marked with *, which were taken by Mr. W. H. Gilder, of the New York *Herald*.

100° W

99°

Ships besei
• Spt: 184

70° N

C. Fe

H.M.S. Erebus & Terror

Wall B.

C. Maria Louisa

Victory Pt.

Irving B.

C. Jane Frankl

Collinson Inlet

Franklin Pt.

VICTORIA STRAIT

Seal Bay

Grover B.

Pt. le Vesconte

Erebus Bay

Pt. Little

C. Crozier

Graham Gore Peninsula

De Long Inlet

Fairholme I.

Hornby I.

Terror B.

Fitzjames I.

Washington B.

Asaph Hall I.

C Herschel
[Cairn erected by Dease and Simpson August 25. 1839]

SIMPS

MAP
— of —
Sledge Journeys and Searches
- of -
Franklin Search Party of 1878-79-80.

Scale in geogr. miles
5 10 15 20

Drawn by H.W. Klutschak

Ship sunk

Mc Gillivray Bay

Smith Pt.

Grant Pt

Wilmot B.

68°

O'Reilly I.

98°

97°

96

Ships beset
Spt. 1846

C. Adelaide

Magnetic Pole

C. Felix

Kent B.

C. Victoria

Beaufort Is.

C. Gloucester

C. Sidney

Humboldt Mountains

Hall Lake & River

WELLIN

Humboldt Ck.

KING WILLIAM

LAND

Secret Bay

Macintock Bay

Cladman Bay

Reindeer Hill

Curren Creek

Douglas B.

Tulloch Pt.

Geddes

Hunt I.

Mt. Peabody

Seaforth Pt.

STRAIT

Thunder Cove

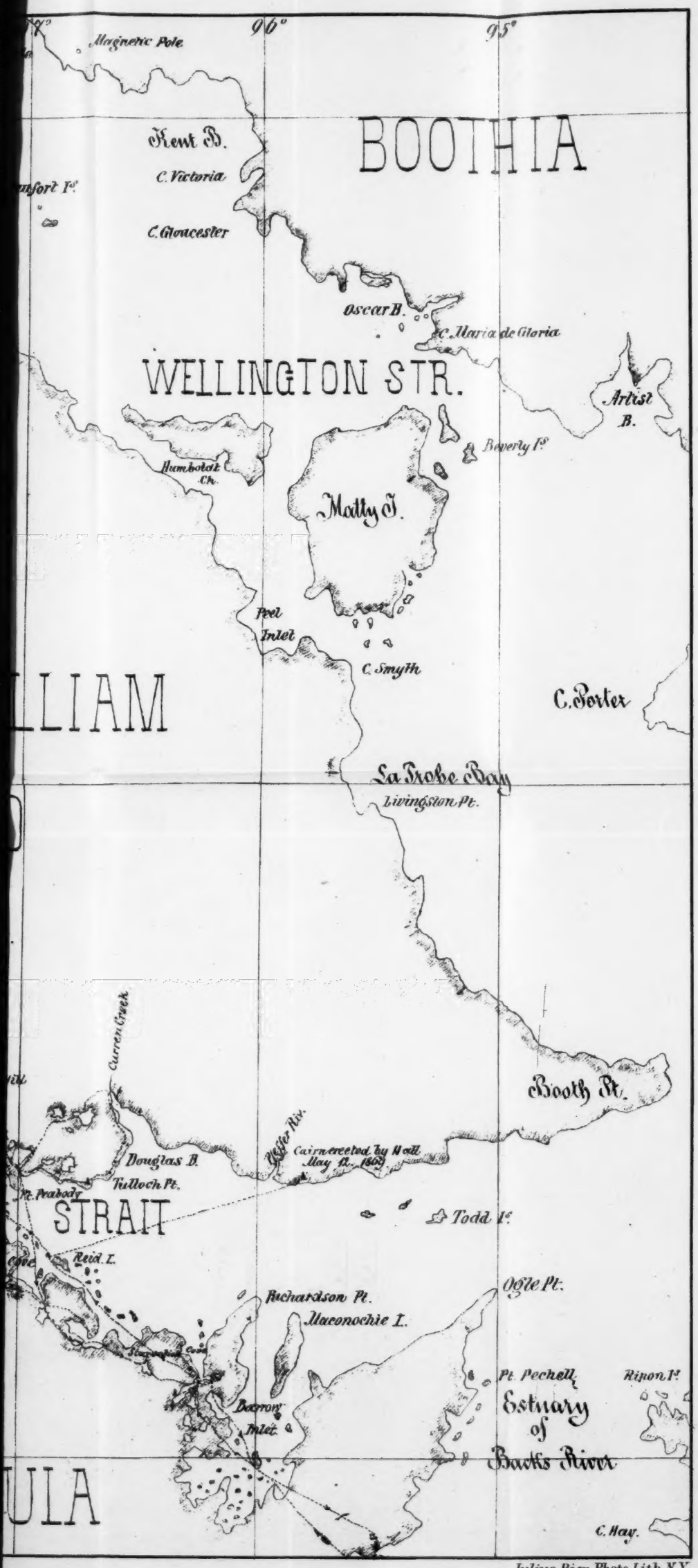
Reid I.

ADELAIDE

PENINSULA

Longfellow Lakes

Sherman Inlet


Magnetic Pole
96°
95°
Kent B.
BOOTHIA
C. Victoria
C. Gloucester
Oscar B.
C. Maria de Gloria
WELLINGTON STR.
Artist B.
Beverly Is
Humboldt Ch.
Matty I.
Peel Inlet
C. Smyth
C. Porter
La Trobe Bay
Livingston Pt.
Booth Pt.
Douglas B.
Tulloch Pt.
Pt. Peabody
STRAIT
Todd Is
Reid I.
Richardson Pt.
Ogle Pt.
Maconochie I.
Pt. Pechell
Ripon Is
Estuary of Banks River
Barrow Inlet
C. Hay.
Julius Bien Photo.Lith N.Y.

Map of Sledge Journey
— of —
Franklin Search Party 1878-79-80

From Apr. 1st 1879 to Mar. 20th 1880

3251 statute miles

Scale. 0 5 10 15 30 60 S.M.

Drawn by H. W. Klutschak.

BOOTHIA

KING WILLIAM LAND

Victoria Str.

Wellington Str.

Adelaide Peninsula

Simpson

Adelaide Peninsula

Sherman Inlet

McCrary Isthmus

Mount Marsh

Scale 1 2 3 4 5 10 15 20 geog. miles

Douglas Strait

Barrow Inlet

Sherman Inlet

McCrary Isthmus

Elliot B.

Mt. Marsh

Backhouse Pt.

Cockburn B.

Hayes River

Dangerous rapids

Stewarts Monument

McKinneys Pk.

Backs River (Admiralty Chart)

Backs River

Montreal Is.

C. Barclay.

Gage Pt.

Backhouse Pt.

Victoria Head.

Cockburn Bay

Hayes River

Lake Franklin

Mad Bay

Dangerous Rapids

Stewarts Monument

Mt. Kinneys Peak

Whirlpool Rapids

Mc Kay's Peak

Backs River

Scale 0 5 10 15 20 30 geog. miles

Nosings of Wager River Sea

Wager River

Hazard Hills

Wheeler Pk.

Southwest Pass.

L. Seidler

Lorillard R.

Whale Pt.

L. Courtois

L. Lupton

Baly B.

Conery R.

Zero lakes

Depot I.

C. Fullerton

Whitney Inlet

Chesterfield Inlet

HUDSON B.

L. Brevoort

Bakers Foreland

C. Jalabert

Burds B.

Marble I.

Julius Bien Photo. Lith. N.Y.

APPENDIX.

No. 1.

THOMAS F. BARRY'S STATEMENT.

Taken down as given by him in reply to questions put by the President of the Society.

In 1864 I wintered in Hudson bay, off Depot island, 63° 30′ N. lat., 89° 30′ long. Depot island is not marked on the charts. It is S. W. of Cape Fullerton.

In 1871 I wintered on Marble island, at the mouth of Rankin's bay, and in 1872 wintered at Repulse bay.

In May, 1876, went as the second mate of the *Ann Houghton*, of New Bedford, on a whaling voyage, and wintered with the vessel at Marble island, mouth of Rankin's bay. In the Spring of 1877 we lost the vessel, which was stranded about 30 miles S. W., at Cape Fullerton, and we were taken off by the Schooner *Abbe Bradford*, and brought us to St. Johns, Newfoundland. I learned to speak the Esquimaux language at Depot island, during the Winter of 1864. I am able to converse with the natives, and to get them to do all that I desire in the way of my business—whaling and trading. Never found that there was any difficulty to make them understand me. When I acquired the language at Depot island, in 1864, I was 22 years old. The natives lived all around the vessel in snow huts, and I had a great deal of intercourse with them. The tribe that I then wintered with, was the Iwilli tribe, the same that Capt. Hall passed five winters with. They belong to Repulse bay, or rather live along the land of Roe's welcome, from Cape Fullerton to Repulse bay.

In 1872, at Repulse bay, two strange families of natives came to the vessel, not of the Iwilli tribe, and from whom we obtained three spoons. I was then in the barque *Glacier*, Captain Ed. Potter.

These natives told us that they had never seen a vessel before, and took the length and breadth of our vessel with their walrus lines and seemed to be astonished at her size. One evening, while I was writing up my journal in the cabin, two natives took notice of the book in which I was writing, and then spoke with the Iwilli natives

about books of the same kind, which were buried in the place from whence they came; and they also spoke about having seen white men—upon which I began to talk with them, as well as Captain Potter, who also spoke Esquimaux. We asked them when that was. They aswered—"Tepso manne" (long time ago). We asked how many winters, and to tell us upon their fingers; but they could not —and they answered—"Amasooa-icky-peta-hong-a-tu (a great many winters past). We asked them where the white men came from, which they had seen; but they could not tell. We asked how many? they said, "Amasooa" (a great many). They said that these white men died of starvation and cold—or, to express it in Esquimaux, "Cod-a-luna icky amasooa, coy-na-cooney amasooa." (white man very cold and hungry). We asked if they could show us on the chart where they came from, and they said yes. Then we gave them a chart, and pointed out the starting point upon it, from Repulse bay, and they traced the coast along Melville peninsula northwards, as far as the projection of Cape Englefield. Then they looked for an island on the chart to the N. W., in the Gulf of Boothia, which they could not find, as it was not on the chart. They said that it was "connie tuck-a-lu" (not far off, or close to that), and used the word kig-a-tunn, which is their word in Esquimaux for island. We asked them if they had ever seen any white men since; and they said no—none—until they had seen us. They told us that these white men they had seen, had died of hunger and cold. We asked them if they had any more articles which the white men had with them, and they said yes—am-a-sooa (a great many). This is all that I now recollect.

These two men and their families stayed there only about a month. It was in the month of February, 1872.

In 1872 we asked them if there was any man who was "Hitata," which, in Esquimaux, means father or leader, amongst the white men. They said, Yes; one. We asked what kind of a coat he had on, and one of them rose up and drew his hand across his wrist in three different places, by which I understood the Hitata had three stripes across the lower part of the sleeve of his coat. I then asked if he had anything on his shoulders, and tried to indicate what I meant as stripes and epaulettes; and they answered, No. I asked whether he was a large or small man, and one of them said, Anainke (large). We asked, then, if he had, like Capt. Potter of our vessel,

the command of the men; and they answered, Yes. They said that when the spring came, and the ice broke up, there was plenty of seal and walrus; but the white men were then all dead. They said that they were buried close to the place where they, the Netchelli, then wintered. They said nothing about valuables being put in the cairn or cache; only the books—putting their hands on my journal in the cabin. They said the books the white men put in the cache were of no value to them, the Netchelli, and they did nothing about them, and that they are there still. (The spoon now shown is a heavy silver one.)

In the fall of 1876 we fell in with some Iwilli natives at Whale Point, about lat. 64° 15′, long. 87° 45′ W., about N. E. of Cape Fullerton. There were among them about four families of the Netchelli tribe. They had the spoon with them which I brought back. I did not know then that the engraving on it was Franklin's crest. I asked them where they got it; they said from white men. I asked them where they saw these white men, and gave them a chart, and asked them if they could show me on the chart where. (In answer to the question put, whether Esquimaux can trace places on the charts, he says: "I have known them frequently to trace places on the charts on other occasions.") They followed the chart up, and very carefully, the same as the others had done, and stopped at Cape Englefield; and, without any prompting on our part, looked for the island in the Gulf of Boothia, the same as the others had done, and said, "No-taca-noona" (where), as if to ask, Where is the island? I don't see it. And they pointed with their finger on the chart N. W. of Cape Englefield, and said there was an island there; and it was on that island that they first saw the white men. I asked them if they had seen any white men since, and they said no. The persons with whom I conversed among the Netchelli were three old men, two of whom said they had seen the white men. These two were from 50 to 60 years old. It was only those three of the Netchelli tribe who took any part in the conversation. I might have learned a great deal more from them, probably, if I had thought it of any consequence. I thought, at the time, that they referred to Franklin's men; but I was not very well informed as to that expedition. These three men, two of whom had more to say than the other, told the same story as those with whom I had con-

versed in 1872. When I asked them where they had got the spoons, they told me they got them from the white men.

I asked them where they saw the white men, and they told me, as I have just said, pointing out on the chart. I asked them what became of the white men. They said they had all died of hunger and cold—using the same expressions as the others had done. I asked them, showing them some books and papers, whether they had seen anything of that kind with the white men. They said yes. (This conversation occurred in the cabin, and there were books and my journal on the table.) I asked them where those things were, and they said the white men had buried them in a "ketch," that Esquimaux word which is equivalent to cache or cairn. They took up my journal, which was lying on the table, and said it was like that. I opened the book and showed it to them. They said that when the white men were with them it was a very severe winter with them, and that game was very scarce, also walrus and seal. As near as I could understand, they said, as the white men died the others buried them, and the last few the natives buried. They said they rolled each body up as they were, in their clothes, in the kepick, the skin blanket on which the Esquimaux lie or cover themselves when sleeping, and then laid the body up on the rock and covered it around with stones. (The Esquimaux here, in Repulse bay, pile stones around the body in a wall until the stones meet on the top and cover the body.) That this was very late in the winter. The natives said that they had that winter to eat walrus hide and seal skin. They did not say that any of the natives had died that winter. They were willing to guide us to the island, the position of which they indicated. It may have been 30 or 50 miles N. W. of Cape Englefield, but, as it was 400 miles from where we were then, at Depot island, we were not willing to undertake such a journey. We, New Bedford whalers, do not take much interest in explorations; we stick to our business, and we were in no way provided for making so long a land journey. Moreover, in every voyage that we have made in this vicinity, we have always heard that the natives of Pelly bay, S. W. of Cape Englefield, are a hostile tribe, who occasionally come and make a raid on the Iwilli tribe of Repulse bay, and take everything away from them. To go in that direction, it would be necessary to go armed, and we were not provided with means for such an expedition.

The silver table spoon shown me, engraved with a fish's head, surrounded by a wreath, was cracked at the junction of the handle to the bowl, and had been neatly mended by the natives with one piece of copper, fastened by joints. It has been shown here to the Esquimaux, Joe Eberling, and to Capt. Buddington, who both say it is Esquimaux work.

No. 2.

JOSEPH EBERLING'S (ESQUIMAUX JOE) STATEMENT,

Made to the President of the Society.

I was born in Cumberland gulf, but lived afterwards at Fox's channel and at Repulse bay. When Captain Hall was there, from 1864 to 1869, I went with him to the S. E. part of King William's land. We went across Rae's isthmus to Colville bay; from there across the land to the bottom of Pelly bay, and then west 68° 30′ to Grinnell lake and Inglis' bay. Off Point Dryden we saw about fifty Netchelli hunting seal. They were much taller than our people. They showed fight when we first saw them, and had knives, and one of them the barrel of a rifle made sharp like a knife. I could not talk with them, and although I afterwards spent six weeks amongst them, I only learnt to talk a little with them. We had a man named Jerry with us, from Repulse bay, who spoke Netchelli. He told them that we did not come to fight, but to ask what had become of white men who had been there; and after Jerry spoke to them they dropped their knives upon the ground and held up their hands, showing that they were ready to talk. Captain Hall, through Jerry, put several questions to them respecting the white men, and after giving them some needles and knives we left them so that they might think over what we had asked them about. Two days after that we went there again. They had built a snow-house for a meeting place, where we met and had a talk with them. Among them were many men and women from King William's land. They described the place where the ship was lost. They said the white men had lost their ship and had tried to go home, and that some of them had died of starvation. Three or four of the Netchelli told us that they had given the white men seal

meat, but that they afterwards neglected them, as they (the Netchelli) wanted to go hunting for seals. King William's land, which is called Tik-Ugh-Tak, Rae's strait and Ross's strait are all called the Netchelli country. They said the white men were in a ship at Wilmot and Crampton bay; that the Netchelli had been on board the ship and got many things there, but that a heavy gale of wind came and broke up the ship, which sunk so that there was nothing to be seen but her masts above the ice. They said she was a large ship, and they stuck out their fingers to show that she had three masts. Jerry asked them what had become of the white men, and they said that when they left them they were going home by Fish river. The questions were put to the Netchelli separately, so that one did not know what was asked of the other, and they all told the same story, that the white men went home by Fish river, and that the last time they saw them they were going in that direction, drawing two boats on sledges; that they all had bad mouths, and that their lips were bleeding, which, the Netchelli thought, was because they were eating too much snow. In King William's land in July you can get no water; it sinks into the ground, and you have to keep it in sealskin bottles. They did not know whether it was scurvy that the men had; there was no scurvy among the Esquimaux, and I think they never have it. I, however, got it once when I went with Captain Hall, for the first time. Some of the Netchelli said that the white men starved because they could get nothing by hunting. Others of the Netchelli thought that they may have met bad Indians by Fish river, who killed them, for Indians hunt up Backs river, and all the Netchelli are afraid of them. They said nothing of seeing any graves of white men. The Netchelli care nothing about books, as they are of no use to them; what they want are knives and spoons.

I know Thomas F. Barry; speaks Repulse bay Esquimaux. I have talked a good deal with him in Esquimaux. He speaks it pretty well; about as well as I speak English. I can always understand him and he always understands me. Several of the whaling captains speak Esquimaux very well. Peter Baine, who was Hall's officer in the mutiny, speaks it a little, but not as well as Barry. Capt. Baker speaks it very well. Barry speaks it as well as he does.

Those Netchelli whom Barry saw, as they had been living among the Repulse bay people, must speak the Repulse bay Esquimaux.

Barry must have spoken to them in that language. He could not speak Netchelli.

I know that Netchelli people come down to Repulse bay and learn the language, and I know that four or five people went from Repulse bay and were a year away in the Netchelli country and learned to speak Netchelli.

I went in May and June with Capt. Hall to Cape Englefield; we went in a sledge. We went along the north coast of Melville peninsula, from Ooglik to Perry bay. We saw a monument at Perry bay, it was a small cairn, about three feet high, of stones. I dug it out. I think it was made by white men. We saw one of big stones, about two feet square, with a big flat stone on top, pointing north. Capt. Hall had Dr. Rae's book with him and Capt. McClintock's book. Every time that Capt. Hall came to a monument he took it down. We saw another monument with a stone pointing to the low ground. We dug along the line where the stone pointed for about fifteen or twenty feet, but the snow was so deep and hard that we could not get to the surface of the ground, having no pick-ax, but only a knife and a shovel. I know there is a big island in 70° N. latitude and about 87° W. longitude. I saw it; but we could not get there, the ice was so very bad. Hall and Lalor, who were with us, tried to get to the island, but they could not. The Netchelli do not live on that island. They are not willing to tell much, because they think the white man believes that they killed the white men and might punish them. They might, therefore, fool the white men when talking to them; but I think it probable that what the Netchelli told Barry at Marble island, when he was there with Capt. Potter, might be true.

No. 3.

LETTER OF ADMIRAL SIR LEOPOLD McCLINTOCK TO THE BRITISH ADMIRALTY.

29 KENSINGTON GATE, W.,
19*th December*, 1877.

SIR: I have the honor to comply with the request of their Lordships, communicated to me by your letter dated the 14th December, covering enclosures.

The statement contained in the *World* newspaper is one of several reports relating to the lost expedition which have appeared from time to time during the last sixteen years.

The mere smattering of the Esquimaux language, such as whaling seaman are able to acquire, compels them frequently to put leading questions; hence arise mistakes and confusion, rendering any information obtained through them open to grave suspicion.

Although the site of the settlement called Netchilli, at which the graves and cairns are said to exist, is clearly stated in one part of the report to be near a Cape Inglefield, which Cape (not known to us) is said to be 30 miles north of Whale point in Rowe's Welcome, yet in another part we are told that a visit to this settlement from Marble island would involve a journey of 1,000 miles.

The actual distance from Marble island to Whale point is only about 100 miles. Besides this discrepancy, and the fact that the Esquimaux have no knowledge of miles, nor of numbers beyond 10 or 15, there are other statements which throw discredit on this report.

The white men are said to have been a *large* party; that several of them wore colored stripes, and were supposed to be officers; and that their dead bodies were wrapped up in skins by the natives, although they were barely supporting their lives on scraps of skins.

It is not usual to wear uniform in arctic expeditions, and it would be impossible to do so when out on land journeys.

Dr. Rae wintered at Repulse bay in 1853–4. Captain Hall subsequently wintered there twice, with native interpreters. Moreover, several whalers have since wintered upon the adjacent coasts, without finding any sign of their having been visited by the lost men, nor any more definite traces than relics such as spoons, &c., which have probably passed through native hands, together with more or less traditional information, from King William's island.

I think it would be well to inform Messrs. Morison and Brown distinctly that there is no outstanding reward for the recovery of records (the only portion of the original grant ever awarded was to Dr. Rae, and not to me, as Rear-Admiral Jones appears to suppose), and they should be further informed that, before the present report could inspire confidence, it is necessary to ascertain more exactly where is the locality of the mounds, graves and cairns.

If it is anywhere northward of Repulse bay, I am of opinion that we possess much more reliable information than any which these southern Esquimaux could afford, from Rae, Hall and McClintock; and I speak with full knowledge of the late Captain Hall's private records, which he allowed me the privilege of reading.

But if the locality is where from the report I should judge it to be, *viz.*, on the west shore of Rowe's Welcome, it can be easily examined; whalers are now in the habit of fishing in those waters annually, therefore the expense of landing at Netchelli with a competent interpreter would be insignificant; and to hold out any inducement to Messrs. Morison and Brown, in furtherance of the enterprise, ought to be unnecessary.

But I would suggest payment for any useful results they might obtain: such, for instance, as proving the visit of any of Franklin's people to the spot, or recovering any of their documents, especially if these last afforded further or more recent information than that contained in the record found at Point Victory.

All such relics and documents should become the property of the government.

I am very unwilling to close any possible opening for further discovery of the fate of the lost crews; since it is just possible that, being foiled in their attempt to ascend the Great Fish river, some few of the younger men may have turned eastward over the uninhabited land, and have even reached the shore of Hudson's bay, before being overtaken by the winter of 1848; graves, mounds or cairns are tangible things, and if readily accessible, render it easy to test the truth of the report under consideration. I believe that as a rule the Esquimaux are truthful; but I have not much confidence in this interpretation of their words.

I have, &c.,

(Signed) F. L. McClintock,

Vice-Admiral.

No. 4.

LETTER OF DR. JOHN RAE TO THE BRITISH ADMIRALTY.

2 ADDISON GARDEN, SOUTH KENSINGTON,
15*th Dec.*, 1877.

SIR: I have received your letter of yesterday's date, written by direction of my Lords Commissioners of the Admiralty, inclosing three printed documents on the subject of an Esquimaux report brought to the United States of America by Mr. Thomas Barry, mate of the whaler *Ann Houghton*, to the effect that there is a cairn at a place on the Arctic coast, about thirty miles south of Cape Inglefield, in which are deposited records of the Franklin expedition, and asking my opinion regarding the importance of or reliance to be placed in these inclosures. In giving an opinion, if I am to make myself clearly understood, I must enter more fully into details, and go back to an earlier date than may appear necessary.

First, then, as to the locality where the cairn referred to is said to exist.

I presume the Cape Inglefield mentioned is the extreme northwest point of Melville peninsula, in lat. 69° 52′ N., about 300 statute miles east in a straight line from that part of King William's land near which Franklin's ships were abandoned, but fully 500 hundred statute miles distant by the route that men could possibly travel by. Apart from the difficulty of distance, and the extreme ruggedness of a part of this coast, the neighborhood of Cape Inglefield would be about the last place that any one in distress would think of going to with the object of obtaining assistance and succor.

On my first visit to Repulse bay, during journeys of over 1,200 miles over ice, in the spring of 1847, when connecting the survey of the Rossa's, or Boothia, with that of Sir E. Parry at the strait of the "Fury and Hecla," owing to a defect in the only map I had with me, about eight miles of this survey was left incomplete. I reached and named Cape Crozier on the west coast of Melville peninsula, about 25 English miles south of Cape Inglefield. I had a cairn built there (according to my usual practice when

stones could be found), not on the extreme point of the cape, but some miles east of it, and a note deposited therein recording briefly the work done.

On my return to Repulse bay in 1853, the natives told me of this cairn, not knowing that it had been built by my men, and that three or four strangers (white men), or their footmarks, had been observed at the place or near it. I, of course, explained to them what I had done on a former visit seven years before. They (the natives) believed I had been only five years absent, and thought no more on the subject.

It is requisite that I should briefly mention the news brought home by me, in 1854, of the sad fate of the Franklin expedition.

The story was that a large party of "white men" were seen by the natives traveling southwards along the west shore of King William's Land. By signs and the word "Took-took" (deer), and pointing to their guns, they made the natives understand that they were going to the mainland, near the Great river, to kill deer. Later in the spring, when the natives were on their way to the Great river, to kill salmon at the breaking up of the ice in July, they found a number of white men, at least 40 (the great difficulty with the Esquimaux is to obtain correct dates and numbers —I have seen an Esquimaux and his wife completely puzzled to tell how many children they had, the total number being only four or five—none of the natives could tell me how many years had elapsed since I had been with them before), scattered about dead, close to the water's edge, on a low, flat part of the coast, which I believe to have been in the neighborhood of Point Ogle, as the native description of it agreed very closely with that of Sir George B——. That this report of the Esquimaux was correct as to the route followed and the time of the year at which the southward journey of the unfortunate travelers was made, is clearly proved by the information and record brought to England by the *Fox* expedition in 1859. There is no doubt that some of the unfortunate men lived until June, for the feathers of geese were found, and the birds do not make their appearance so far north until that month, so that none could have been shot previous to this date.

Naturally, my first duty on hearing the sorrowful tidings was to endeavor to find out if any one survived. To gain this end, I offered large rewards in guns, knives, daggers, saws, &c., with still

larger promises for the future if they could tell me of even one living white man.

Their reply was always in the negative. I then made them similar offers for books, and showed them printed manuscript and blank books. They put aside the blank books, saying that they saw none of that kind, but noticed at least 10 or 12 books with markings on them, but could not distinguish manuscript from print. They said they were very sorry, but, having no use for the books, they were given to the children to play with and were destroyed. Such was the simple and apparently true tale told by these poor people, which I was almost bound to believe, because they could have no reason to tell me an untruth.

Further to confirm my belief in the truthfulness of the Esquimaux, I was informed by them, through my excellent interpreter, of many circumstances that had occurred on board the ships of Sir E. Parry and Sir J. Ross, which agreed perfectly with parts of the narrative of these distinguished officers written many years before.

I cannot help believing that if this cairn mentioned by Mr. Barry as containing records and other valuables, had been in existence and known to the natives, self-interest alone would have induced them to acquaint me with the fact.

That the Esquimaux have a great respect for caches or depots of provisions I know from experience; but that they should leave "untouched" and "hold sacred" a cairn containing books and other valuables is a story too wonderful for even the most credulous to believe in.

The natives must have taken the watches, medal and money brought home by me from the bodies of the dead, surely a more sacred place of deposit than a heap of stones which they are said to have "held sacred for at least 27 years."

I have now to call attention to some statements of the late American arctic explorer Hall, who spent several winters at and in the neighborhood of Repulse bay, having during the greater portion of the time a whaling ship within a short distance.

In the narrative of the North Polar expedition recently published at Washington, under the auspices of the Director of the United States Naval Observatory, we find at folio 197 as follows: "In 1868, after three years' residence among the natives," Hall became confident that "some of Franklin's men still survived on the shores

of the 'Fury' and 'Hecla' strait and determined to rescue them." This information was that the foot-marks in the snow of two or three strangers or "white men" had been seen and a cairn or monument built by them.

Hall went with a party of Esquimaux to the place described, about 400 miles from Repulse bay by the very circuitous route followed, but only 250 miles by the more direct road taken by me in 1847. He reached Cape Crozier and found *near* it (which seems not on the extreme point of the cape but some miles east of it) the monuments he was in search of (no living men, however), but the *deep snow prevented his examining it for records!!!* This statement is utterly incomprehensible to me. That a man should have traveled hundreds of miles to look for supposed survivors of the Franklin expedition, and having found the cairn *he believed* to have been built by them, he should have been prevented from examining it by deep snow, which should have easily been removed sufficiently for that purpose in half an hour, is surprising beyond measure. The facts are, as already mentioned, that I with one of my men (the others having been left a day's journey behind) was at Cape Crozier on the 27th May, 1847 (21 years before Hall's visit), built a cairn and deposited a note, which Hall would no doubt have found had he dug away the snow from one side and pulled the stones down. The question is, did he do so? Surely not half an hour only, but half a day if requisite, would have been not unprofitably spent in examining a cairn believed by Hall to contain records of so much interest and value. To have found my little note instead would have been a great disappointment, and for several reasons he may have thought it advisable not to make known the fact. It is with reluctance and regret that I have come to this conclusion, because I can in no other way solve the difficulty.

In the extract from the *World* is mixed up the terrible year of starvation and death among the Esquimaux of Repulse bay and the deaths and starvation of the Franklin party. The whole harrowing details of the suffering of my native friends in the sad winter of privation were told me by the survivors in spring 1854; but in no single particular was their suffering in any way connected with this of Franklin's party.

I am happy to say that the lives of one of the best families (six in number) were saved by a gun and ammunition I had given to one

of them in 1847. In summing up my opinion, I may say that I can see no reason why any of Franklin's party should have wandered away 500 miles to Cape Inglefield, in a direction the very opposite to that which we know by Esquimaux report the party took, and which we are informed by the record brought home in 1859 they intended to take, and by following which they would have fallen in with friendly Indians, who had been told to look out for them, and bring them in safety to the Hudson's Bay Company's settlements, which they would have done by traveling to the southwest for a shorter distance than 500 miles. I believe that the cairn mentioned by Barry is that built by me in 1847, which Hall in 1868 also mistook as one put up by some of Franklin's people.

It is not the first time in arctic history that so small a mole-hill as the story of a cairn of stone and a few footsteps in the snow, has by lapse of time and frequent repetition grown into a very considerable mountain.

The whole report brought home by Barry I believe to be a mistake in all its important particulars, and if the Franklin records are ever found, it certainly will not be anywhere in the neighborhood of Cape Inglefield. Such books as the unfortunate explorers thought requisite to carry with them, would have been found where the dead were seen at the furthest point south known to have been reached on the shores of the continent. If anywhere else a depot was made, it is probably on King William's Land. Should Messrs. Morison and Brown carry out their most liberal and praiseworthy enterprise of sending out a vessel to make their intended search, I have no doubt some further relics of the Franklin expedition may be obtained in the form of spoons, forks, &c., as these were scattered far and wide among the natives by barter, but I doubt much if a single record of value will be secured. Should my Lords Commissioners require any further details, I shall be most happy to give them as far as I can.

I am, &c.,

(Signed) JOHN RAE.

No. 5.

LETTER FROM THE BRITISH ADMIRALTY.

ADMIRALTY, *Jan.* 18, 1878.

SIR: In reply to your letter of the 25th November last, and its inclosures, in which it is reported that the Esquimaux from Netchilli settlement near Cape Fullerton have knowledge of the existence of a cairn containing records, &c., of the Franklin expedition; I am commanded by my Lords, &c., of the Admiralty, to request that you will move the Earl of Derby to cause copies of the enclosed letters from Dr. Rae and Vice-Admiral Sir L. McClintock, on this subject, dated the 15th and 19th ult. respectively, to be transmitted to H. M's. naval attaché at Washington, with a view to his bringing them to the knowledge of the gentleman with whom he has been in communication in this matter.

2. Rear-Admiral Jones might also be informed that in the event of Messrs. Morison and Brown carrying out their project of sending an expedition in search of the Franklin relics, &c, my Lords will be glad to give a reward for any useful results that may be obtained, as suggested in Par. 10 of Sir L. McClintock's letter herewith.

I am, &c.,

(Signed) ROBERT HALL.

The Under Secretary of State,
Foreign Office.

No. 6.

SYNOPSIS OF THE FRANKLIN SEARCH,

BY

ELIAL F. HALL, ESQ.,

Recording Secretary of the Society.

The reports in the New York *Herald* and other papers of Lieut. Schwatka's search after relics and records of Sir John Franklin's expedition have attracted public attention once more to the sub-

ject of the mysterious fate of Franklin and his men. It was on the 19th day of May, 1845, that he sailed from England in command of two vessels, the *Erebus* and the *Terror*, to discover, if possible, a northwest passage through the Arctic ocean from Baffin's bay to Behring's strait. Neither he nor any one of his men was ever afterwards seen alive by any civilized person. His vessels were last seen by a whaling ship in Baffin's bay, on July 26, 1845. Five years elapsed before the arrival of any later trustworthy news in respect to the destination or fate of these two vessels. It was supposed that they had probably sailed out of Baffin's bay towards the west, through Lancaster sound and Barrow's strait. Accordingly, the summer of 1850 witnessed no less than twelve vessels in this strait all engaged in searching for the missing expedition. On the 23d of August, two of these vessels, commanded by Captain Ommaney, arrived at a point called Cape Riley, on the northern shore of the strait. A boat's crew sent ashore from the *Assistance* to erect a cairn on this cape, first came upon traces of the missing expedition, consisting of pieces of rope, a cairn of stones and preserved meat tins marked with the name of "Goldner," who was the contractor who had supplied Franklin with provisions. About the same time a cairn and other similar traces were seen on Beechey island, only a few miles from Cape Riley, by a boat's crew sent from the *Intrepid*, the other vessel commanded by Captain Ommaney. He does not seem to have duly appreciated the discovery of these indisputable evidences of the presence of parties from the missing ships. At all events, he made no further search at this point, but pressed on towards the west with his vessels, leaving it to Captain William Penny, the commander of the *Lady Franklin* and the *Sophia*, to take up and follow out the clue thus found, and to achieve the credit of ascertaining beyond all doubt the first winter quarters of Franklin's squadron. As soon as Penny was informed of Ommaney's discoveries, he went ashore with three or four of his officers, exclaiming that he "would take up the search from Cape Riley like a bloodhound." On the 26th of August, about six miles north of Cape Spencer, he found the site of an encampment, a hut built of stones, and various abandoned articles. But a much more important discovery was made the next day on Beechey island. A searching party sent there by Penny found three graves with oaken head-boards, on which were carved the names of three of Franklin's men, and the

dates of their deaths—two in January, and one in April, 1846. Numerous relics and vestiges of a lengthy sojourn were also found.

There was no longer any room for doubt but that the head quarters of Franklin's squadron, in the winter of 1845-46, were at or near Beechey island. But the mystery as to where it had afterwards gone and as to what has become of it, remained unsolved nearly four years longer. In the spring of 1854, Dr. John Rae, while engaged in an overland exploration of the regions northwest of Hudson's bay, was told by the Esquimaux that several years previously white men to the number of about forty had been seen dragging a boat over the ice near the north shore of King William's island, and that later in the same season the corpses of some thirty persons and some graves were discovered on the continent, and five dead bodies on an island near it, about a long day's journey towards the northwest from the mouth of Great Fish river. Dr. Rae obtained from the Esquimaux, and brought home with him, silver spoons and forks, and various other articles, which were identified as relics from Franklin's ships, as they bore the crests and initials of fifteen of their officers. Dr. Rae received the prize of ten thousand pounds awarded by the British Government to the party who, in the judgment of the Board of Admiralty, should first succeed in ascertaining the fate of the missing expedition.

But the most important discovery of all was yet to be made. Some record or document that should tell the melancholy tale of disaster and death had long been eagerly sought for. Such a record was found in a cairn at a place called Point Victory, about twelve miles from Cape Herschel, on the northwestern coast of King William's island, on the 6th of May, 1859. A cairn is defined to be: "A pile of stones heaped up as a landmark or to arrest attention, as in surveying, or in leaving traces of a party, etc." This discovery was made by Lieutenant Hobson, an officer in the search expedition in the screw steam yacht *Fox*, fitted out by Lady Franklin and commanded by Captain McClintock. There were, properly speaking, two records—one written across the face of the paper, and the other written a year later, around the margin of the same side of the same sheet with the first. Both were short—each consisting of only a few lines. But the handwriting of every word was easily identified. The first bore date May 28th, 1847, and specified the latitude and longitude of the point at which the *Erebus* and the

Terror had spent the second winter, which point was about twelve miles from the northern extremity of King William's island. All, including Franklin, were then well. The second record, around the margin, was dated April 25th, 1848. It stated that the ships were deserted on the 22d, having been beset since the 12th of September, 1846, that Sir John Franklin died on the 11th of June, 1847, and that the total loss by death in the expedition had been nine officers and fifteen men. This record was signed by Captain Crozier, the successor of Franklin in the command. One hundred and five souls landed at this point from the ships and expected to start the next day, April 26th, for the Great Fish river. They were, in part at least, the same as those of whose melancholy fate the Esquimaux had informed Dr. Rae. Captain C. F. Hall in his travels and researches found various relics but no records of the lost expedition. The principal incentive to the search undertaken by Lieutenant Schwatka was the report made in New York City about three years ago by the mate of a whaling vessel, and named Barry, that while he was wintering in North Hudson bay, the Esquimaux told him the particulars as to where a book of records deposited under a cairn by the survivors of Franklin's expedition might be found. Schwatka found no records, but from authentic information obtained from the Esquimaux, he seems to have established the fact of the deposit of such records, contained in a sealed tin box, two feet long and one foot square, together with the place of such deposit, and the subsequent complete destruction of the records by the natives.

No. 7.

ENGLISH AND AMERICAN FRANKLIN SEARCH EXPEDITIONS.

FROM PROF. J. E. NOURSE'S NARRATIVE

OF THE

SECOND ARCTIC EXPEDITION MADE BY CHAS. F. HALL.

1.—*From the West through Behring's Straits.*

YEARS.	VESSELS.	COMMANDERS.	LINE OF SEARCH AND COASTS EXAMINED.
1848–'52 ..	Plover.....	Com. Moore. Captain Maguire.	Through Behring's Straits beyond Point Barrow, to lat. 73° 51′ N., long. 163° 48′ W., with a boat expedition from the Plover up the Mackenzie river and east to Cape Bathurst; Mr. R. Sheddon, in his yacht Nancy Dawson, rendering assistance.
1848–'49 ..	Herald.....	Captain Kellett.	Discovered Herald island, and visited and named a part of the land reported by Wrangell.
1850–'55	Enterprise ..... Investigator..	Captain Collinson. Com. McClure.	Coast of North America from Behring's Strait to Dease strait and coast of Banks Land. Investigator abandoned June 3, 1853, in the Bay of Mercy, on the north coast of Bank's Land. Commander McClure crossed on the ice to Dealy island to the Resolute and Intrepid, and returned across the Atlantic to England. Parliament gave £10,000 to him and his officers.
	(Supply ships)		
1851–'52 ..	Dœdalus.....	Captain Wellesley.	
1853.....	Amphitrite.....	Captain Frederick.	
1853.....	Rattlesnake	Command'r Trollope	
1853	Diligence	Lieutenant Elliott.	
1854.....	Trincomalee ...	Captain Houston.	

2.—*From the East through Baffin's Bay.*

YEARS.	VESSELS.	COMMANDERS.	LINE OF SEARCH AND COASTS EXAMINED.
1848–'49	Enterprise	Sir J. C. Ross.	North and west coasts of North Somerset, north shores of Barrow strait and the shores of Prince Regent's Inlet.
	Investigator ...	Captain Bird.	
1849–'50	North Star ..... (supply ship)	Master Saunders.	Landed provisions on one of the Wollaston islands.
1850–'51	Lady Franklin .	Captain Penny.	Coasts of Cornwallis island and shores of Wellington channel.
	Sophia.....	Captain Stewart.	
1850–'51	Resolute	Captain Austin.	South coasts of the Parry islands and the passages between them, northwest and east coasts of Prince of Wales Island to long. 103° W., lat. 72° N.
	Assistance	Capt. Ommaney.	
	Pioneer	Lieut. Osborn.	
	Intrepid	Lieut. Cator.	
1850–'51	Advance.....	Lieut De Haven, U. S. N.	First Grinnell expedition; shores of Wellington channel; discovered Grinnell land.
	Rescue.....	Master Griffin, U. S. N.	
1852–'54	Assistance	Sir E. Belcher.	Shores of Wellington channel and the coasts of Melville and Prince Patrick islands; the Assistance, Resolute, Pioneer, and Intrepid abandoned Aug. 26, 1854; the Resolute picked up at sea, lat. 64° 40′, long. 61° 30′, Sep. 11, 1855, by Capt. James Buddington, of New London, Conn.; brought to the United States, and presented to England by joint resolution of United States Congress of Aug. 28, 1856; delivered to Queen Victoria by Commander Hartstene, U. S. N., Dec. 16, of the same year.
	Resolute.....	Captain Kellett.	
	Pioneer	Lieut. Osborn.	
	Intrepid	Lieut. McClintock	
	North Star	Captain. Pullen.	

2.—*From the East through Baffin's Bay.*—(Continued.)

YEARS.	VESSELS.	COMMANDERS.	LINE OF SEARCH AND COASTS EXAMINED.
1853 ...	Phœnix.....	Com. Inglefield.	Shores of Wellington channel; landed stores at Cape Riley; returned with part of McClure's command; Lieutenant Bellot, of France, perished in the ice, Aug. 17, 1853; the ship lost at Cape Riley, August 21, 1853.
	Breadalbane....	Lieut. Fawckner.	
1853-'55	Advance	Dr Kane, U. S. N.	Second Grinnell expedition; Smith's Sound, lat. 82° 27′ N.
1854....	Phœnix...	Com. Inglefield.	Returned to England from Beechey island with part of Belcher's and McClure's commands.
	Talbot	Com. Jenkins.	
1855....	Release.....	Lieut. Hartstene, U. S. N.	Ships sent out for the relief of Dr. Kane; found him on his return at Lievely or Godhavn, Greenland.
	Arctic.....	Lieut. Simms, U. S. N.	

3.—*Land Expeditions.*

1848-'49.—Sir John Richardson and Dr. Rae searched the coasts of North America between the Mackenzie and the Coppermine rivers. (Dr. Rae, under the Hudson Bay Company, in 1846-'47, made a voyage of discovery from Fort Churchill to the Gulf of Boothia, surveying the Gulf of Fury and Hecla strait on the east and Lord Mayor's Bay of Sir James Ross on the west, determining there an isthmus.)

1849.—Dr. Rae reached Cape Krusenstern.

1849-'51.—Lieutenant W. J. S. Pullen, from the Plover.

1851.—Dr. Rae: coasts of Wollaston island and east coast of Victoria land to lat. 70° N., long. 101° W.

1853-'54.—Dr. Rae: coasts of Boothia isthmus; obtained relics of Franklin's expedition (rewarded by vote of Parliament).

1855.—J. Anderson and J. G. Stewart: west coast of Adelaide peninsula.

4.—*Private Expeditions.*

YEARS.	VESSELS.	COMMANDERS.	LINE OF SEARCH AND COASTS EXAMINED.
1850–'51	Felix ..... Mary	Sir John Ross. Com. Phillips.	A portion of Cornwallis island. (Dr. R. A. Goodsir, brother of the surgeon of the Erebus in the whaler Advice, in 1849, also searched Baffin's Bay and Lancaster sound.)
1850.....	Prince Albert...	Com. Forsyth.	Found Barrow strait and Prince Regent's Inlet blocked with ice; coasts of Prince of Wales Island and North Somerset.
1851–'52 ..	Prince Albert.	Capt. Kennedy. Lieut. Bellot.	Shores of Prince Regent's Inlet and Bellot straits. Lieutenant Bellot, of France, was second in command.
1852.....	Isabel	Com. Inglefield.	Wostenholme, Whale, Smith's, Jones and Lancaster sounds, and Baffin's Bay. (Captain Kennedy, in 1853, sailed in the Isabel for Behring's Straits; voyage abandoned at Valparaiso.)
1857–'59 ..	Fox	Capt. McClintock.	Completed survey of North Somerset, Prince of Wales Island, Boothia—Felix peninsula, and William's Land, finding many relics of Franklin's expedition, and obtaining at Point Victory the only record as yet recovered.